POWER TRANSMISSION DESIGN

JULY 1961

INCLUDING BEARINGS DESIGN/APPLICATION

do you trust your lubrication guide?

POWER TRANSMISSION DESIGN gives an insight into the work that makes a grease guide reliable; brings you up to the mark on lubricating procedures

IN THIS ISSUE

this is the only tool you need to get the benefits of electric clutching

WARNER ELECTRIC

new Warner Electro-Sheave Clutch puts automatic control, instant engagement and release on your machine

Warner's new preassembled clutch-pulley package makes it possible to provide automatic cycling, easy jogging on any machine—in a manner never before possible! Starting with a simple Allen key—without costly engineering, without machining of any kind—you can modernize all of your power drives with Warner's Electro-Sheave. You get custom-engineered equipment at a *fraction* of what you'd expect to pay!

In just ten minutes your Warner distributor can show you how simple it is to install an Electro-Sheave on your machines. He'll show you how it can increase production, reduce wear on your motors, belts, starters. Call him today—or mail coupon below.

Electro-Sheave Clutches available for 1 to 25-hp applications.

Electro-Sheave Clutch Package increases duty cycles on carton-sealing conveyor line

With ever-increasing production line speeds, conveyor motors and starters were breaking down. Slowing production or installing an additional conveyor was not practical. The Warner distributor power transmission specialist recommended an Electro-Sheave preassembled clutch-pulley package. After a trial on one conveyor, the Electro-Sheave Clutch was installed on two more conveyors. They have literally made millions of stops and starts without trouble—and they could easily handle five times the cycles per minute now demanded of them! A Warner Electro-Sheave Clutch can step up duty cycles—in a matter of minutes—without costly engineering or machining.

WARNER ELECTRIC

Warner Electric Brake & Clutch Co., Dept. PTD-7, Beloit, Wisconsin

I'm interested in the advantages of Warner Electro-Sheaves.
Rush me literature today!

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Title_____

Company_____

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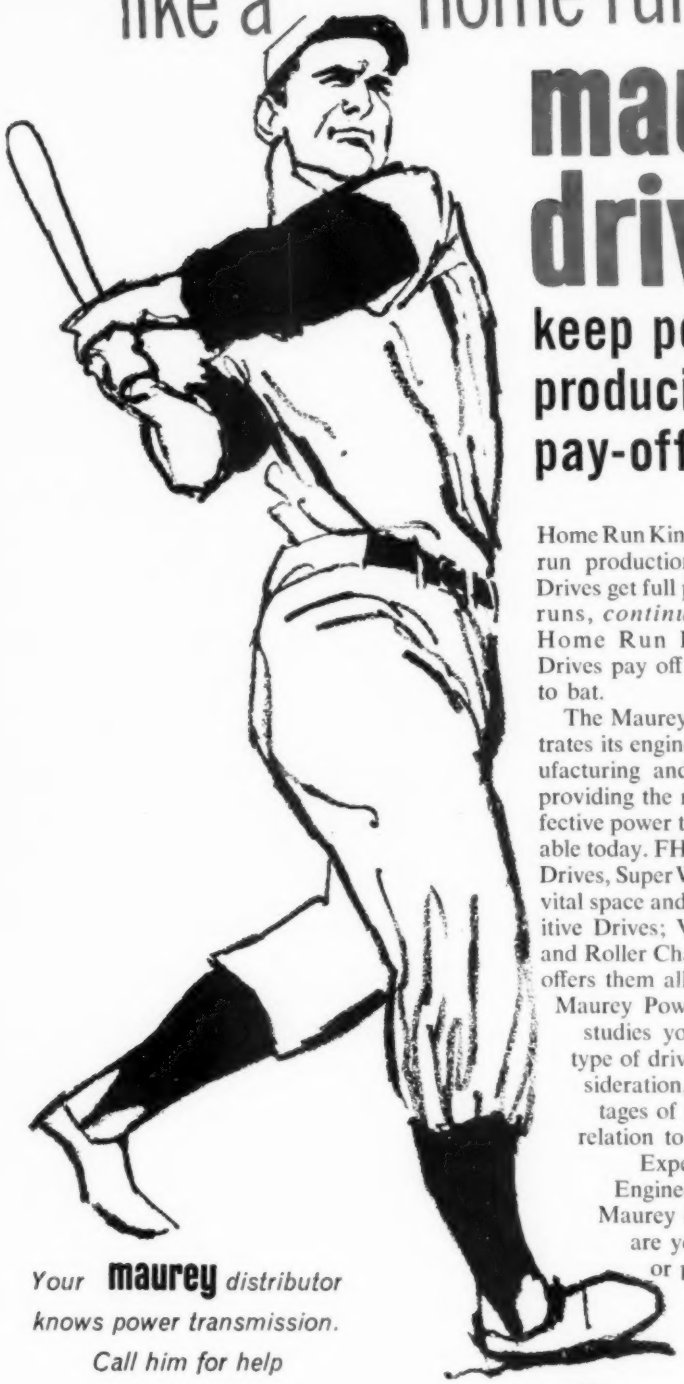
like a home run king..

maurey drives

keep power producing at the pay-off point



Home Run Kings get extra power into run production, *regularly*. Maurey Drives get full power into production runs, *continuously*. That is how Home Run Kings and Maurey Drives pay off big wherever they go to bat.

The Maurey organization concentrates its engineering, research, manufacturing and service facilities on providing the most complete and effective power transmission line available today. FHP and Multiple V-Belt Drives, Super Wedge Drives that save vital space and weight; compact Positive Drives; Variable Speed Drives and Roller Chain Drives . . . Maurey offers them all. That is why when a Maurey Power Transmission Man studies your drive problem, no type of drive is exempt from consideration, and why the advantages of all are fully studied in relation to your particular need.

Experienced Maurey Field Engineers are at your service. Maurey Catalogs and Manuals are yours on request. Write or phone for information.

Your **maurey** *distributor knows power transmission. Call him for help and fast delivery.*

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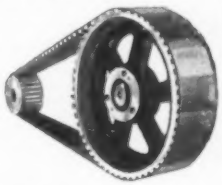
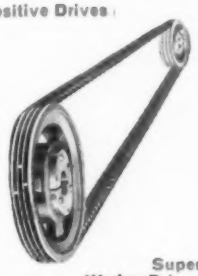
THE **maurey** LINE INCLUDES THE DRIVE THAT'S RIGHT FOR YOU

V-Drives
FHP and Multiple

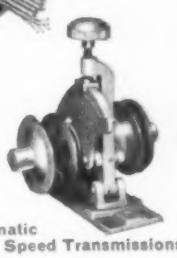


Positive Drives



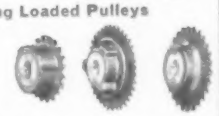
Super
Wedge Drives

Variable Speed
Drives



Maureymatic
Variable Speed Transmissions

Spring Loaded Pulleys



Sprockets,

Roller Chains

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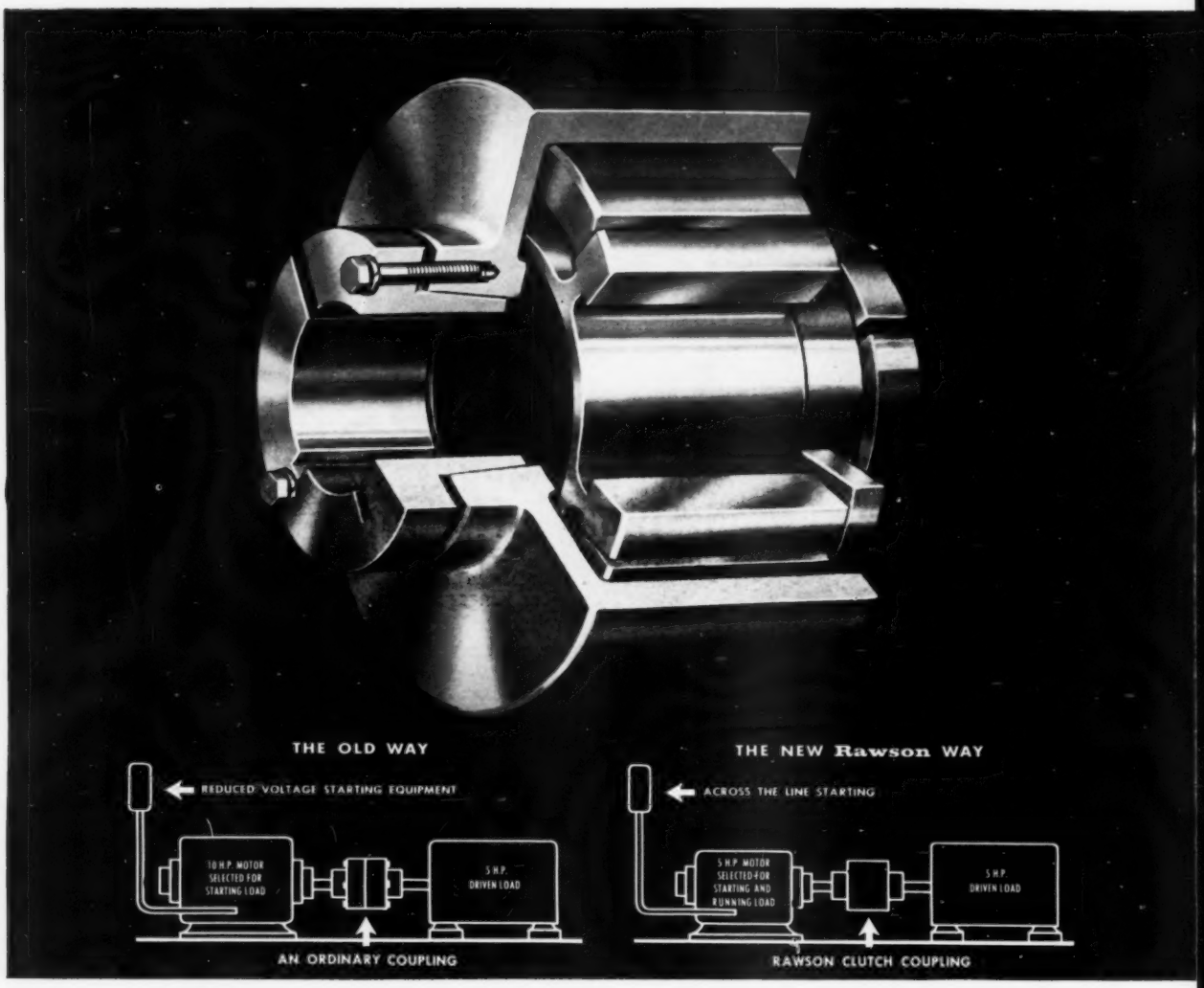


HERE'S WHAT RAWSON CLUTCHES WILL DO FOR YOU

NO-LOAD MOTOR STARTS – Rawson clutches engage at a pre-selected RPM, therefore motors start under "no-load" conditions. Thus, starting current is lower and motor acceleration time is reduced to a fraction of a second.

SMOOTH, SHOCK-FREE STARTING – For any load from fractional to 3,000 horsepower, Rawson starts are smooth and gradual. Even the most delicate equipment and fragile materials are protected.

NO POWER LOSS – At normal running speed, Rawson clutches operate with zero percent power loss. Fluid type clutches have at least a 4% loss.

ACROSS-THE-LINE STARTING –The purchase of costly reduced voltage starting equipment is no longer required. With Rawson "no-load" starts, motors can utilize low-cost across-the-line starting.

YOU CAN USE SMALLER MOTORS –With Rawson "no-load" motor starts and cushioned starting of loads, motor size can be selected for running power only–this may reduce required motor capacity by as much as one-half. Also, on high inertia loads, Rawson clutches eliminate the need for expensive high-torque motors–standard NEMA B motors can be used.

CONTROLLED ENGAGEMENT–Centrifugal force causes a Rawson clutch to gradually engage at a pre-selected RPM as it is brought up to running speed. Engagement can be further controlled by using Rawson clutches having a delayed engagement feature. For internal combustion engines and turbine applications, this delayed engagement feature assures "no-load" during warm-up periods. Delayed engagement Rawsons are also ideally suited for dual drive (standby) installations.

AUTOMATIC OVERLOAD PROTECTION – Power transmission system components are never subjected to the stresses of a continuing overload–Rawson clutches automatically slip until the overload condition is corrected.

FREQUENT MOTOR REVERSAL–Because the Rawson design permits driving in either direction, provides "no-load" motor starts, and assures smooth starting of driven equipment, frequent load reversals are accomplished without overheating the motor.

REDUCED MAINTENANCE COSTS – Shock loadings are absorbed by Rawson clutches–stresses are not transmitted to gear trains or other components of drive system. Thus, expensive repairs and downtime are kept to a minimum.

NEW RAWSON

CENTRIFUGAL CLUTCHES & CLUTCH-COUPLINGS

Permit Use of Smaller Motors . . . Lower Starting Equipment Costs . . . Provide Cushioned Starting of Driven Equipment . . . Automatic Overload Protection

Rawson clutches and clutch-couplings are of all-metal construction to assure longer life and maximum horsepower capacity per size. They drive in either direction and provide slip-free power at normal operating speeds for applications up to 3000 horsepower.

Because the Rawson design permits "no-load" starting of motors: acceleration time is much faster; starting current is greatly decreased; across-the-line starting can replace costly reduced voltage equipment; and based on lower starting current required, smaller motors can often be employed.

The cushioned starting feature of Rawson clutches frequently permits using NEMA "B" or standard squirrel-cage motors for high inertia loads instead of expensive special high-torque motors. Also, delicate equipment is protected by this elimination of starting shock. On any type of equipment, overloading or jamming will cause a Rawson clutch to slip—protection is automatic and positive.

Rawson clutches function as direct-drive clutch-couplings (in-line, shaft-to-shaft connection) or as indirect-drive clutches through V-belts, chains or gearing. For internal combustion engines and turbine applications, Rawsons can be furnished with a delayed engagement feature that provides "no-load" starting and warm-up idling. As the driving unit is accelerated, the Rawson will engage at a pre-selected R.P.M. There is no slipping or power loss at normal running speed. This same delayed engagement feature makes Rawson clutches ideal for dual drive or standby applications—automatic disconnect and predetermined engagement speed is provided for both prime movers.

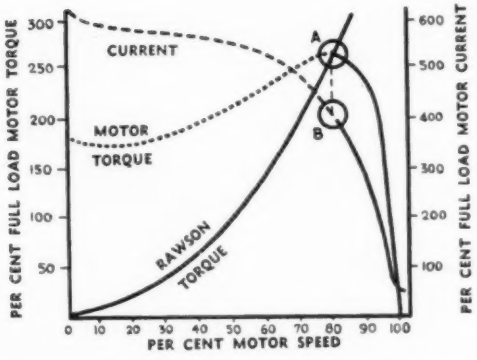
Rawson clutches are simple in design for economy and reliability; they never require adjustment; heat-checking and brake-fade are eliminated; indirect drive clutches utilize standard "QD" type sheaves and direct drive clutch-couplings use "QD" type bushings for ready adaptability to every standard shaft size.

For higher efficiency, lower costs, reduced maintenance and full overload protection, specify Rawson automatic centrifugal clutches and clutch-couplings. These modern centrifugal clutches and their applications are fully described in the Rawson catalog—ask your Rawson distributor or write for your copy.

FORMSPRAG COMPANY

23583 Hoover Road, Dept. 109-A, Warren (Detroit), Michigan

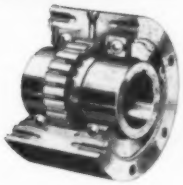
Representation Throughout The World • Precision Power Transmission Products



Typical torque and current characteristics of a standard NEMA B motor. Because Rawson clutch does not fully engage until after peak torque speed "A" is reached, motor acceleration time is much faster, peak current period is greatly decreased and motor operates more efficiently "B". Thus, smaller motors and across-the-line starting can be used.

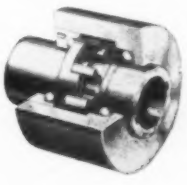
OTHER FORMSPRAG PRECISION POWER TRANSMISSION PRODUCTS

FORMSPRAG
Over-Running Clutches



These modern sprag-type clutches provide greatest torque, precision and life on any over-running, indexing or back-stopping application.

REVLOK
Dual Torque-Locking & Positioning Devices



These multi-purpose devices stop feedback torque; provide two-directional drive, positioning over-running, back-stopping and load-releasing.

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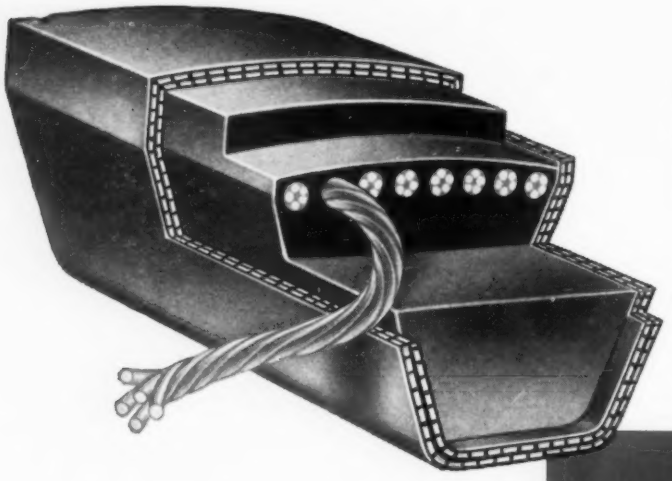
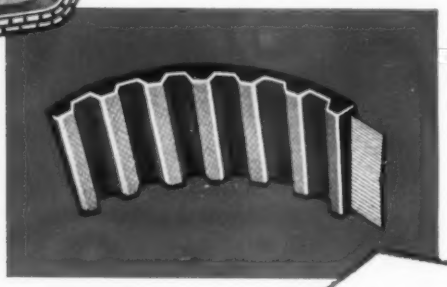


Need High Capacity In Compact Space?

DA 358 V-BELTS. **This major design improvement in V-Belts brings you unprecedented compactness, high capacity and drive economy.**

Chain and Gear Benefits with No Metal-to-Metal Contact?

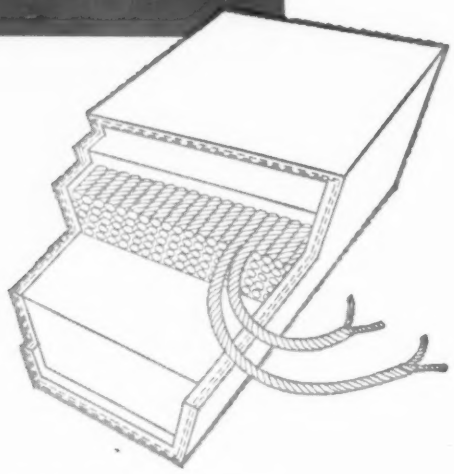
DA POSITIVE DRIVE BELTS. **Revolutionary tooth-grip principle; no stretch; no constant lubrication. Highly versatile.**



Whatever your V-Belt needs, DURKEE-ATWOOD *meets them*

What do you want in a V-Belt? You want consistent performance, long trouble-free life and full-rated power transmission. That means the belts must be made of the finest quality materials, with careful attention to engineering details, manufacturing processes and testing procedures. Durkee-Atwood V-Belts are made of the newest high tenacity synthetic fibres to assure length stability in storage. The exclusive Durkee-Atwood "Iso-Dynamic" Vertical Matching Machine eliminates the "sag error" that develops when V-Belts are matched on horizontal equipment. This assures equal power transmission from all belts on multiple drives . . . Look to Durkee-Atwood for *quality, service* and *savings* ...the most complete line of industrial V-Belts.

Look for the DA DURKEE ATWOOD *On Your V-Belts*



40% Extra Capacity in Regular V-Belts?

RED SHIELD MULTIPLE V-BELTS. **Increased capacity at no increased cost. Available in oil and heat resistant and static dissipating constructions.**

Top Performance in Variable Speed Drives?

VARIABLE SPEED BELTS. **For constant performance. Abrasion-resistant cover; crowned cross section maintains stability under extreme loads.**

DURKEE-ATWOOD V-BELTS

DURKEE-ATWOOD COMPANY MINNEAPOLIS 13, MINNESOTA

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POWER TRANSMISSION DESIGN

THE MAGAZINE OF MACHINE DRIVES

JULY 1961

volume 3 number 7

FEATURES

IDEAS

BEARING SECTION

DEPARTMENTS

FACTS AT YOUR FINGERTIPS:

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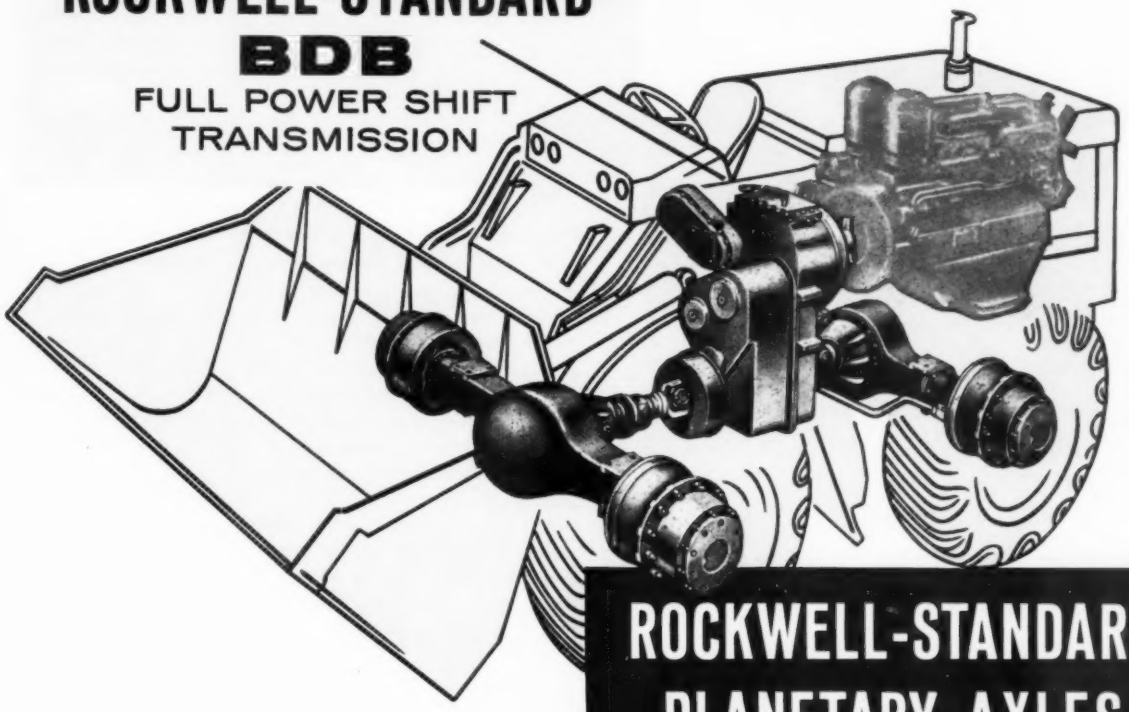
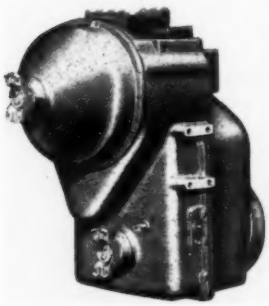
BDB
FULL POWER SHIFT
TRANSMISSION



ROCKWELL-STANDARD
PLANETARY AXLES

Loaders and similar heavy-duty vehicles teamed with these components are "computer matched" for a winning performance. Optimum traction, acceleration and power utilization *assure faster work cycles with larger per hour profits.*



Rockwell-Standard type BDB Hydra-Drives transmission combines in one package the desirable features of a hydraulic torque converter and full power shift transmission with compact "built-in" drop box construction. Clean, rugged, four-speed countershaft design reduces maintenance costs. Built to last, it contains up to 35% fewer parts, is easier to understand and quicker to service.

Rockwell-Standard Planetary Axles assure dependable, rugged, efficiently designed units capable of maximum performance on any heavy duty operation. Exclusive features provide equal distribution of loading to all planetary gears—a minimum of maintenance—constant lubrication of all parts—and a full range of capacities in rigid and steering axles.

Another Product of... **ROCKWELL-STANDARD CORPORATION**

ROCKWELL R STANDARD

Transmission and Axle Division, Detroit 32, Michigan

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LETTERS

Address letters to:
The Editor
Power Transmission Design
812 Huron Road, Cleveland 15, Ohio

Patent problems . . .

Reading through your magazine it occurred to me that you might be able to advise me.

I have applied for a patent on a variable speed transmission. It uses a slightly modified roller chain and standard sprockets and is infinitely variable from 0 to the full input speed. Full torque is available at any selected speed range.

Lee V. Way
15 Cecil Street
Sumter, S. C.

See our reply to the following letter.

Wanted—interested company

For some time I have read, enjoyed and used some of the ideas from your fine magazine.

Since you are acquainted with new developments in the power transmission field, you probably know a company that specializes in the development of inventions in the power transmission line.

I have made a patent application on an automatic, infinitely variable transmission with a preset input torque. It is entirely mechanical and suitable for high horsepower.

A local consulting firm which checked my plans before I made the patent application said that the idea has merit. Now I want the opinions of experts to advise me as to the commercial worth of the devise. Any advice, please?

William E. Morris
Box 502
Nickerson, Kansas

We consulted a patent attorney of our acquaintance and he reported as follows:
Companies are extremely cautious, in general, about getting involved with outsiders' patents. However, if patent is already applied for, as in this case, they suggest the following method of procedure.
Ask your patent counsel to compose a letter giving some details of the invention. He should state who it is he represents, and state that you want to enter into negotiations in a certain direction.

AGMA Manual

Where can I obtain a copy of the new AGMA Gear Classification Manual which was covered in your June article, p. 33.

E. M. Greggor
Alemone Brass Co.
Cleveland

AGMA executive director, John Sears, says:
"The new manual, AGMA 390.01, has been mailed to all official representatives and Standard holders of AGMA. Additional copies are available to member companies at $0.75, and to non-members at $1.50."
The address is:

J. C. Sears, Exec. Director
AGMA
1 Thomas Circle, N. W.
Washington 25, D. C.

When you think about gearing...

CINCINNATI

CUSTOM GEARS and GEAR BOXES permit *complete freedom* in design. You specify and get gearing made precisely to your exact requirements.

Ask for this brochure—CINCINNATI custom gears are made in all types to 72″ diameter cut teeth, 39″ shaved teeth, 25″ ground teeth.

better still . . . Send us your prints for quotation

CINTI

THE CINCINNATI GEAR CO.

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Custom Gear Makers Since 1907 GEARS, good gears only

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NEWS

from the power transmission field

Report on AGMA annual meeting

THE AMERICAN GEAR MANUFACTURERS ASSOCIATION held its 45th annual meeting at Hot Springs, Va., June 4-7. AGMA now has 125 member-companies. New members are: DeLaval-Holroyd Inc., Electra Motors, Illinois Tool Works, National Pneumatic Co. Inc., Janette Div., Reliance Electric and Engineering Co., Sewall Gear Mfg. Co., Sterling Electric, and U. S. Electrical Motors.

• **Gear Manual**—*The AGMA Gear Classification Manual for Spur, Helical and Herringbone Gears* is now available (see POWER TRANSMISSION DESIGN *p.* 33, June issue). The manual sets up a practical gear classification system for these gears. Also, it lists the more common types of materials and heat treatments.

• **Edward P. Connel Award**—AGMA presented this award to C. R. Burrell, president, Tool Steel

Burrell

Products Sales Corp., Cincinnati. AGMA gives this award not more than once annually to an individual who has made outstanding personal contributions to further the art of gearing. The citation reads: "In recognition of his many and valuable contributions as an industry representative in government and for his guidance in producing the *AGMA Gear Classification Manual.*"

• **New Officers**—Charles F. Bannan is the new president of AGMA. He is vice president of Western Gear Corp., Lynwood, Calif. Mr. Bannan has been active in AGMA, serving as treasurer, vice president of the products

Bannan

Jackson

division, and a member of the board of directors.

New vice president of the products division is J. Harper Jackson Sr., sales manager of the Jackson Gear Co., Pittsburgh. He has served as an officer in AGMA, and a member of the board of directors.

The board of directors has four new members. Elected for 3-year terms were E. J. Borisch, Milwuakee Gear Co., Duncan Dorris, Dorris Co. Inc., and R. M. Honegger, Farrel-Birmingham Co. Inc. R. E. Smallwood, Dominion Engineering Works Ltd. was elected for one year.

• **Technical Activities**—The Automotive Gearing Committee discussed techniques for measuring transmission gear noise. A current technique is a functional test on a dynamometer test stand. During this test, the trained operator listens for unusual gear sounds. In addition, the operators select transmissions from production and install them in test vehicles. The operators rate the transmission for gear sound when the vehicle is driven at various combinations of speed and load.

The Bevel Gearing Committee discussion included selection and rating of gears, and design considerations for bevel gear blanks. Wells Coleman, Gleason Works, submitted a paper on selection and rating of bevel gears for committee review. The paper covers problems of design of bevel-gear drives. These include the type, size, mounting, and lubrication. The paper discusses four basic types of bevel gears: straight, spiral, zero spiral, and hypoid.

The Measuring Methods and Practices Committee presented a symposium on the proposed gear inspection manual which is based on the *Gear Classification Manual.* The proposed AGMA inspection manual for spur, helical and herringbone gears sets up a definitive and practical method of inspection for each AGMA quality class of gear as listed in the *Gear Classification Manual.* The proposed AGMA standard on a composite method of gear inspection is intended to specify a method of inspecting gears by the gear-rolling method.

John Erler presented a special report on the **International Conference on Gearing** held last October in Essen, Germany. He discussed a new, fast process of nitriding. This process produces better properties for gearing than the older gas process. The new process takes minutes instead of the hours needed for gas nitriding. Two engineers in the audience claimed that the new process has the same disadvantages as gas nitriding. They are still looking for other processes.

The Automated and High Production Gear Line Inspec-

New ROTO MISSION®

Most versatile transmission ever developed!

PATENTED

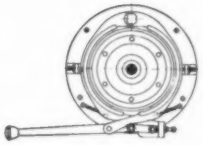
With these standard accessory features

SPRING REACTION ARM

Incorporates a series of leaf springs which provide progressive overload capacity, reduce shock loading, and prevent internal damage to the unit.

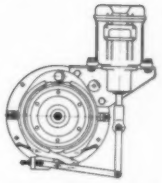
FRICTION REACTION ARM

A spring-loaded friction clutch combined with the reaction arm assembly. Designed to slip at a preselected torsional overload. Restores normal operation automatically when overload ceases.



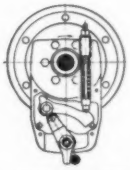
MANUAL FRICTION CLUTCH

Permits manual engagement and disengagement of the unit. Provision is made for adjusting the clutching pressure as well as compensating for wear.



ELECTROMAGNETIC CLUTCH

This modification of the manual friction clutch provides remote control of the unit by means of solenoid actuation.

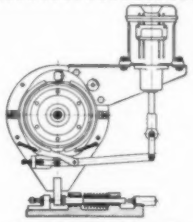


TORQUE RELEASE ASSEMBLY TYPE "A"

A mechanical attachment—integral with reaction arm—which provides complete disengagement when a preselected torque is exceeded.

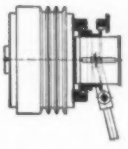
TORQUE RELEASE ASSEMBLY TYPE "B"

A mechanical attachment—separately mounted—which provides complete disengagement when a preselected torque is exceeded.



TORQUE LIMITING CLUTCH

Mechanical modification of the electromagnetic clutch assembly to provide automatic disengagement when a preselected load is exceeded.



DIRECT MESH ATTACHMENT

Permits 2-speed operation through a manually operated clutch mounted on reaction hub.

AIRBORNE®

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Circle **2** on Reader Service Card

NEWS

tion Committee is looking for a reliable drafting standard for splines and gears. They are working on sample plans to inspect gears. They intend to investigate a statistical quality-control method.

The Machine Tool Gearing Committee talked about a practice for machine-tool gearing. This practice will refer to AGMA standards. It's designed to help the practicing engineer. It will contain all references to AGMA material.

• **Marketing**—Accounting Council chairman E. V. Carlson reported that 47 companies had a total 1960 sales of $263,680,137. These sales covered coarse gears, fine gears, reducers, aero space gears, and nongears. He emphasized that the impact of costs on profits must be understood if a business is to be successful. The Council is planning a two-day program to be attended by financial executives of member companies.

Marketing Council chairman M. J. Horan discussed the importance of planning. He reported that 69 companies participated in the monthly gear index. The index is used by AGMA to indicate trends in the gear market. Horan said that net income is declining even though net sales have increased. He emphasized that organizations should set attainable objectives in their programs.

• **Next Meeting**—AGMA will hold its semiannual meeting on October 30, 31, November 1, 1961, at the Edgewater Beach Hotel, Chicago.

MEETINGS

JULY

4- 7 **National Society of Professional Engineers.** Annual Meeting, Olympic Hotel, Seattle, Washington.

18-20 **Western Plant Maintenance Show.** Pan Pacific Auditorium, Los Angeles, Calif.

25-Aug. 10 **International Trade Fair and Aviation Exhibition.** McCormick Place Exposition Center, Chicago, Ill.

TROUBLE SHOOTER

assigned to industrial maintenance

A thoroughly reliable source of supply for bearings and other vital power transmission equipment is your best defense against production breakdowns. A thoroughly reliable member of the ASSOCIATION OF BEARING SPECIALISTS will help you to avoid trouble . . . and he is invaluable to you when unforeseen emergencies occur! Through an association member every conceivable replacement bearing is available to you immediately. His qualified sales engineers can provide the technical advice needed to keep production rolling. Insure yourself against costly power transmission breakdowns . . . contact your nearby member of ABS today!

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Bearing Eng. & Supply Co.
Austin, Texas
Capitol Bearing Service
Baton Rouge, Louisiana
Louisiana Bearings
Beaumont, Texas
Behring's, Inc.
Billings, Montana
Bearings Supply
Boise, Idaho
Western Bearing
Boston, Massachusetts
Bearings Specialty
Bridgeport, Connecticut
Bobker Bearings
Buffalo, New York
Buffalo Bearings
Cedar Rapids, Iowa
Iowa Bearings Co.
Charlotte, North Carolina
White Bearings
Chattanooga, Tennessee
Volunteer Bearings
Chicago, Illinois
General Bearings
Clifton, New Jersey
Bobker Bearings
Corpus Christi, Texas
Stewart Dean Bearing
Dallas, Texas
Bearing Chain & Supply
Coastal Plains, Inc.
Davenport, Iowa
Iowa Bearing
Denver, Colorado
Allen Bearings Supply
Des Moines, Iowa
Iowa Bearing
Duluth, Minnesota
Minnesota Bearing
Detroit, Michigan
Michigan Bearing
El Dorado, Arkansas
Coastal Plains Supply
Eureka, California
Bearings & Trans. Prod.
Fairbanks, Alaska
Bearing Eng. & Supply Co.
Fargo, North Dakota
Western Bearing & Supply
Flagstaff, Arizona
Semon Ind. & Welding Supply
Glendale, Arizona
Semon Industrial Supply
Grand Junction, Colorado
Bearing & Power Transmission Co.
Grand Rapids, Michigan
Michigan Bearing
Green Bay, Wisconsin
Libert Bearing
Hibbing, Minnesota
Minnesota Bearing
Highland Park, New Jersey
Bobker Bearings
Houston, Texas
Behring's Bearings Service
Indianapolis, Indiana
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Jersey City, New Jersey
Bobker Bearings
Kansas City, Missouri
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Milwaukee, Wisconsin
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Minneapolis, Minnesota
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Oklahoma City, Oklahoma
Fleck Bearing
Omaha, Nebraska
Precision Bearing & Trans.
Orlando, Florida
Miller Bearings
Phoenix, Arizona
Semon Bearing & Supply
Pittsburgh, Pennsylvania
Bearing Service
Pittsfield, Massachusetts
Bearing Distributors
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Western Bearings
Port Arthur, Texas
Behring's, Inc.
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Bearing Eng. & Supply Co.
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Bearing & Trans. Co.
Sioux Falls, South Dakota
Western Bearing & Supply
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White Bearing
Spokane, Washington
Empire Bearing
Tampa, Florida
Miller Bearings
Toledo, Ohio
Binkelman Bearings
Trenton, New Jersey
Trenton Bearings
Troy, New York
Bearing Distributors
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Semon Bearing & Ind. Supply
Twin Falls, Idaho
Western Bearings
Tyler, Texas
Bearing, Chain & Supply
Westbury, New York
Bobker Bearings
Wichita, Kansas
B-R-C Bearing
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Keystone Bearing & Supply

Circle **5** on Reader Service Card

THE COAL SHOW—
some power transmission applications

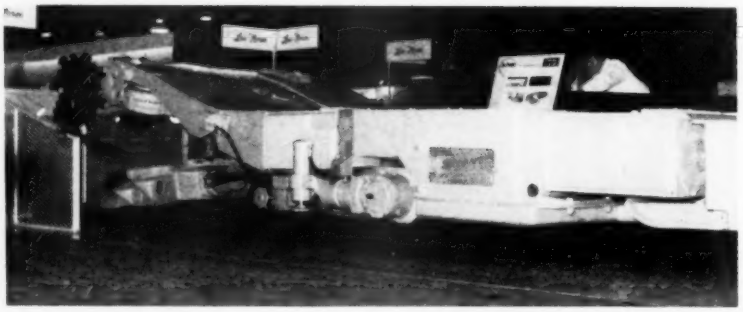
To the design engineer, the interest in drive systems was obvious at the 1961 coal show in Cleveland.

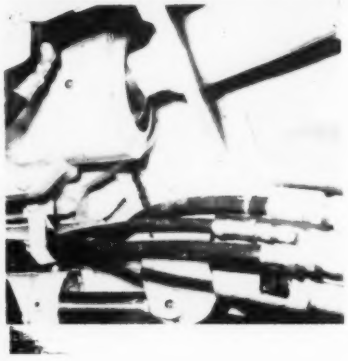
Component applications ran the gamut of the "always unusual" design of mining machinery. For those interested in proved, yet unusual, drives, the American Mining Congress provided plenty of material for engineering study.

A welcome upswing has been predicted for the coal industry. By the time of the next show in 1964, many new and unique uses of all types of drives can be expected.

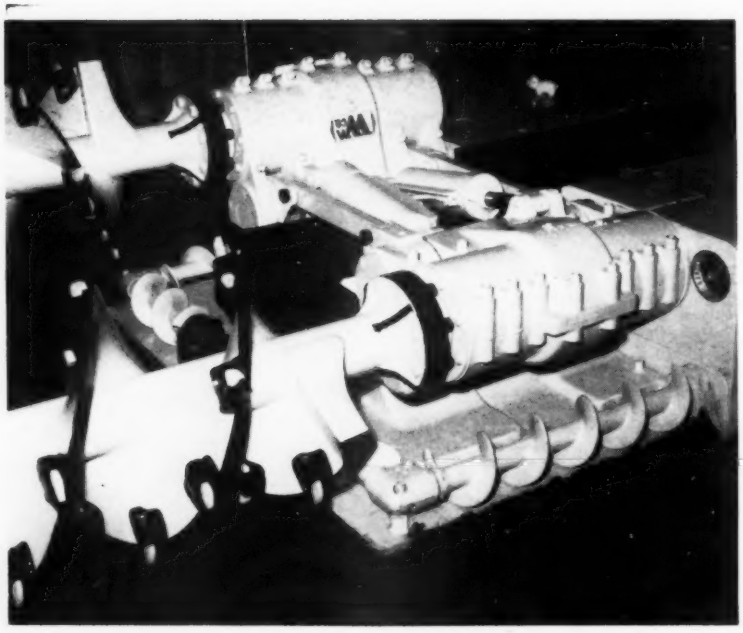
THE COAL MEN ARE INTRIGUED with the new sources of power. Allis Chalmers, while including much coal mining machinery in their display, are pushing ahead with plans that have little use for the "black gold". Their fuel-cell powered train set, for instance, ran throughout the show. The cell on display produces 40 watts at 72 F, uses liquid fuel to generate electricity directly from chemical energy.

HERE'S THE DRIVE SYSTEM END of a continuous-mining machine. By hydraulically raising and lowering its dual auger drilling units, it follows and clears a vein. Three hydraulic motor driven screws (one seen at lower right) gather the coal gouged out by the augers and feed it to a belt type conveyor. This high speed mining unit uses 800 psi to power the digging augers; a separate, lower pressure system turns the gathering screws. Machine is manufactured by the Wilcox Mfg. Co.

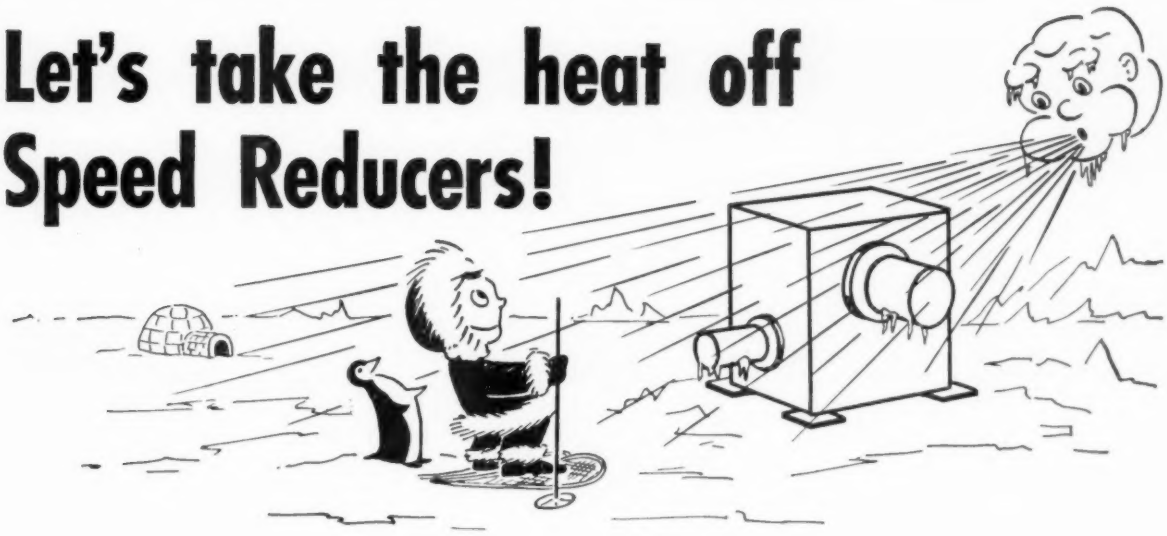




"THE LOWEST-BUILT COAL CUTTER YET," Herbert Dillon, assistant to the president of Lee-Norse Co., Charleroi, Pa., told our editor. Minimum height of 32 in. is made possible by an ingenious design aspect. Two universal ball-joints (inset) were used on earlier models to allow sidewise motion of the cutting head. Now, they are the pivot on which the whole head moves up and down, and side to side. Maximum cutting height of the machine is 5 ft. 6 in., determined by the stroke of a hydraulic piston (inset, foreground). The cutter is powered by a 350 hp ac or dc motor; it weighs 27 tons, and is capable of producing up to 5 tons of coal per min.



Let's take the heat off Speed Reducers!



A worm gear speed reducer is one of the toughest little customers in captivity. It reduces speeds day-in, day-out, with little complaint. While it works long and hard, it has limitations—set by ratio, center distance, RPM, mechanical and thermal HP ratings, etc. And, depending upon how precisely it was selected and fitted to the job requirements, it will do what it has to do.

But sometimes it's forced to play outside of its league. It must cope with job requirements that vary from here to there—normal 8 to 10 hour service without recurrent shock, the same length of service where there is some shock loading, continuous low-speed service and almost countless others. But the thing that really puts the pressure on reducers, the thing that's lurking in *every* set of job requirements—is h-e-a-t.

When you exceed the thermal capacity of a reducer for more than an hour or so, excessive temperature thins the lubricant resulting in wear; material, bearing and oil seal failures; etc. Of course, the proper lubricant will help but it can't cure the continuing problem of excessive heat.

So how can we lick this toughy? One way is to build the reducer housing oversize, big enough to radiate the heat away and keep temperatures down. But this type sticks out in aisles, louses up compact designs and barks shins. Then, we might try a smaller housing complete with fins on it to dissipate the heat. If this still doesn't work, another trick is to use a reducer with capacities and ratings a step above the ones we need. This is sending a man to do a boy's job. It's impractical, inefficient and costly. There *has* to be an easier, better, saner and cheaper way to do it. And there is!

In certain cases, where the size and type of reducer permits and where we can gain enough in thermal HP rating to keep heat generation in bounds, Cone-Drive Gears does it with fan-cooling.

What's that? Simple. Just add a fan to the worm shaft plus the necessary air shields, fan cover, etc., and presto!—heat is no longer a problem. The air shields direct the fan-pushed air over the fins on the lower portion of the reducer. The fins are shaped and spotted to guide the air stream where it is needed. Thermal HP ratings are boosted tremendously, as high as 147% above those of standard reducers in some cases! Those over-worked, over-heated reducers will now do the job you bought them to do.

Other advantages? They're here in abundance. The size of the reducer stays the same. All parts on a Cone-Drive fan-cooled reducer are 100% interchangeable with parts for standard reducers. Oil capacity is identical. Shields are quickly removed without disconnecting the reducer. (This is important where severe operating conditions make periodic cleaning necessary). The reducer can also be operated *without* fan-cooling just by taking off the fan and shields.

This simple addition to standard Cone-Drive HU speed reducers might be just your answer—might save you some money. Write for Cone-Drive's Bulletin CD-218. It will tell you all about the full line of Cone-Drive double-enveloping worm gear reducers as well as the fan-cooled kind. Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

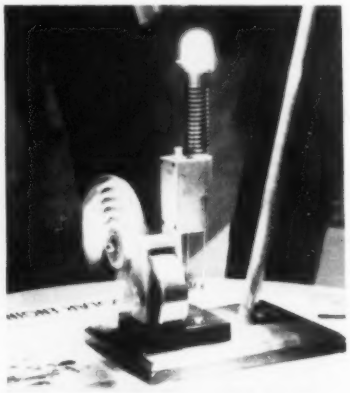
Circle **10** on Reader Service Card

Visitor's report on the DESIGN ENGINEERING SHOW

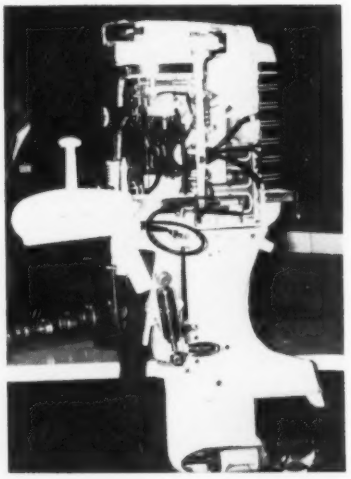
"Was it worth it," we asked, as we tramped around huge, well-lit Cobo Hall, from May 22 to 25.

And the response was a cheerful chorussed "Yes". Visitors to the show were unanimous in their opinion that there was more to see this year than ever. Exhibitors exulted over the apparent increase of "top brass" and high caliber engineering personnel at the show.

We found much of interest, above and beyond the report in our May issue. Here are some typical views and news from the show:



LIKE THE COAL MEN, (see p 14) designers were excited by the possibilities of the exotic power sources. The Batelle Memorial Institute booth, featuring a solar engine, was consistently crowded. The engine, working on a Sterling cycle, used air as the working fluid and generated 1/10 hp. Heat received through the glass top (shown glowing) expands air to force the piston down, turning the fan. Temperature of the hot air is 1350 F, efficiency of the engine is 39 per cent.



THIS 70 HP MERCURY OUTBOARD ENGINE uses a high-temperature fluorocarbon lip-seal to prevent crankshaft leakage. It was displayed at the International Packing Corp. booth. Boat fans will be interested in hearing that this engine—the 2 cycle, 6 cylinder, 1961 model—set a water-speed record of over 140 mph last year.

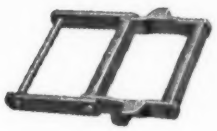
ACTUAL PROTOTYPE OF A GANG LOG SAW is built with diminutive standard parts. Fac Co., claim models built with their components perform all the functions of the final product, thus saving the time and cost of complicated boardwork in design. Model illustrated is driven by an electric motor, and uses:

- Friction gear drive
- Gear rack
- Bevel ring gear and pinion
- Chain and Sprockets
- Ball bearing journal boxes
- Pillow blocks with bronze bushings

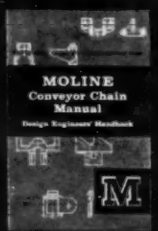
The company provides kits for making almost any type of machine that relies on power transmission components and standard framework.

SELECTION CHART for triple-tested Moline Chains*

Here is a quick, easy reference chart for comparing the seven most popular Moline Chains. Are you familiar with all the attachments available... the range of sizes... and all their applications? This chart will help you compare their size, capacity range and various uses. It's a part of the new, illustrated "Moline Conveyor Chain Manual and Design Engineers' Handbook" which is available now to help you specify the right chain for your requirements. Write today for your copy.

	CHAIN TYPE & NUMBER	APPLICATION AND INSTALLATION	ATTACHMENTS	PITCH RANGE IN INCHES	ULTIMATE STRENGTH IN LBS.
	Detachable Chains—25, 32, 33, 34, 42, 45, 50, 51, S-51, 52, 55, 57, 62, 67, 75, 77, 78, 88, 95, 103, 108, 114, 124	Widely used throughout industry, conform to "manufacturers' standard" and available in a wide variety of sizes. Many attachments make this type versatile and adaptable to any light to medium-duty conveyor service.	A-1-2-3-12-110 C-1-5-8-15 D-3-4-5 E-1 F-2-8-16 K-1-2-3-5-40-73-345 H-1-2 K-1-2-3-5-40 L-2 M-1-3 R-1-2 S-1 Scraper 1-29	.902 to 4.063	700 to 17,000
	Pintle Chains 400 class. Light weight Pintle. 700 class.	Serviceable, long-wearing, moderately-priced chain for general elevating, conveying and power transmission service for drives at low and intermediate speeds with moderate loads. In "400" lightweight and "700" class types.	A-1-12-115 D-5 E-1 F-2-5-16 G-1-6-19 K-1-2 M-1 F-2-5 F-22-6" F-2-22-8" A-2-42 K-1-2-720-A-2-730 720-M-1 M-1-2	1.375 to 4.720	4,200 to 22,000
	H-Type Mill H-60, H-62, H-74, H-75, H-78, H-82, H-85, H-87, H-95, H-124	Designed primarily for heavy drives and transfer conveyors in saw mills and pulp and paper mills but widely used throughout industry. Strong and rugged, provided with wearing shoes for stiffness and long service life.	A-1-12 F-4 G-1-6-19-48 H-1-2 K-1-2 M-3 R & L RR	1.654 to 4.000	7,000 to 30,000
	Combination Type Mill Chain 6104, 6110, 8116, 8480	Designed for the same applications as regular H-type conveyor chains and refuse chains but has larger diameter rivet, greater ultimate strength for more rugged duty in general drag conveyor service applications.		6.00 to 8.00	42,000 to 56,000
	Combination Chains—C-55, C-77, C-102B, C-102½, C-110, C-110-C, C-111, C-111-C, C-131, C-131-C, C-132, C-132-C, PW-132, C-188, MW-188	Very rugged and serviceable for use in bucket, transfer and many other types of conveyors. Widely used in cement, chemical, lumber, quarrying, mining industries. Available in pin and cotter assembly or riveted construction.	C-3-132 RF-12 F-2 G-6-19 K-1-2-3 LL-25	1.631 to 6.050	9,000 to 50,000
	Dairy Conveyor MC-33	Extensively used in dairy and bottling industries, designed for both horizontal and lateral turning. Detachable construction, interchangeable with manufacturers' standard 4250, available only in extra strength Promal.		2.500 only	12,000
	Ley bushed Chain—823, 825, 830, 844	Developed for hard, rugged service under extremely abrasive and other adverse conditions. Used extensively in conveying or elevating sand, gravel, cement and in similar industries where service demands are rigid.	K-2 F-2	4.00 to 6.00	19,000 to 40,000

Write today for your free copy of the Moline Conveyor Chain Manual and Design Engineers' Handbook.



*Call your nearby Moline dealer today for help on your chain problem. Complete design service available for special chains or unusual applications.

Leaders for 60 years

Moline Chains

MOLINE MALLEABLE IRON CO., St. Charles, Illinois
Specializing in the manufacture of chains

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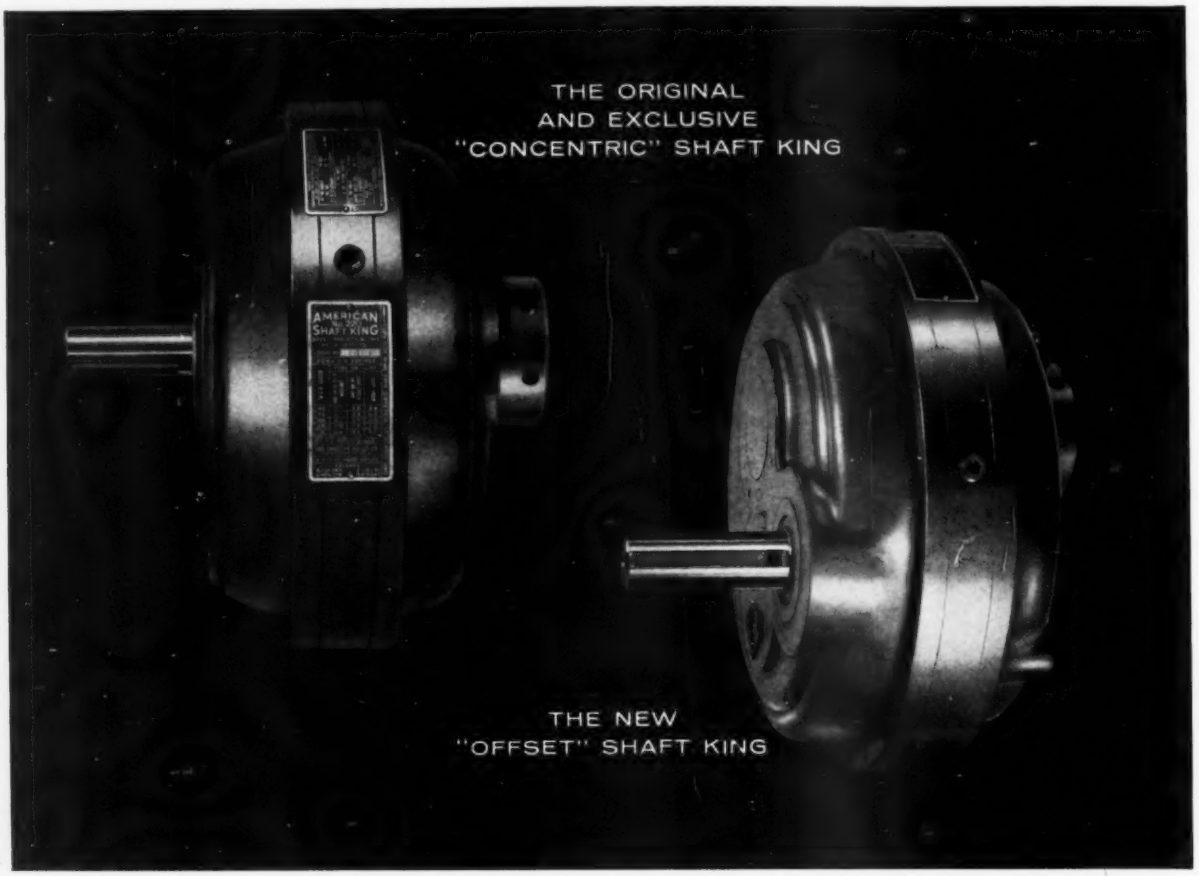

First and Still the Finest SHAFT-KING Speed Reduction Drives by

In the popular SHAFT-KING SPEED REDUCTION DRIVES, American Pulley offers you the world's most complete line of shaft-mounted reducers. Whatever your application, you'll find a SHAFT-KING DRIVE to suit it perfectly: from F HP to 60 HP . . . in 5:1, 13:1 and 20:1 ratios . . . and for any drive speed from 5 to 350 RPM.

SHAFT-KING SPEED REDUCTION DRIVES are *performance-proved,* too. Since 1941, when American *pioneered* the shaft-mounted reducer, over 150,000 SHAFT-KING DRIVES have been installed.

Whatever your power transmission problem, there is a standard American Pulley product—or one can be designed—to solve it. Call your American Pulley salesman.

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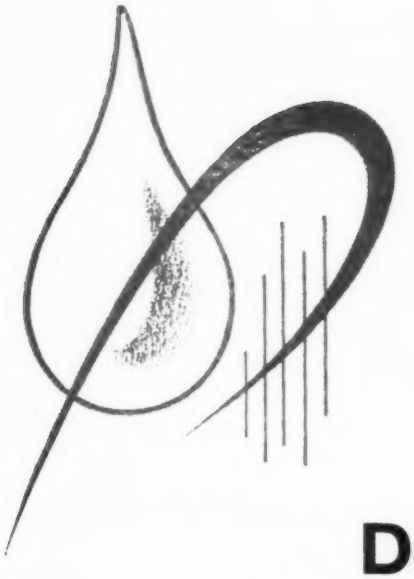
POWER
TRANSMISSION
DESIGN
JULY 1961



Do you trust your LUBRICATION GUIDE?

THE IMPORTANCE OF PROPER LUBRICATION cannot be overemphasized. Although lubricants perform many diverse functions, such as cooling, sealing, and so on, their most important function, so far as the power transmission specialist is concerned, is the reduction of friction losses.

Even with proper lubrication, friction losses mount up at every point of contact of moving surfaces. Pistons, sliders, bearings, gears—are all wasting costly power. And the treatment of most lubrication problems is largely empirical, depending on trial-and-error investigations. There is no formula that can prove the choice of lubricant for a given application . . . no calculation that will check grease A against grease B. Despite the strenuous efforts of the past few decades, there is still a wide gulf between the fundamental and applied states of knowledge of friction.

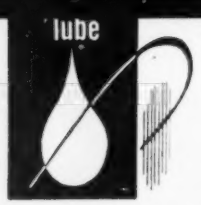
First, a program

Then what is the right way to procede? Where is the manual with the best guide to lubrication?

There are many other factors that should be considered first:

- Is the in-plant lube program in good working order?
- What system is being used to ensure the grease selected for a given point is actually applied there?
- Are suitable (economical) means of applying the lubricant in use?
- Is lubrication applied at the time interval it should be? How do you know this?
- How much lubricant is being wasted through improper storage?
- Do your components last as long as they are supposed to?

With these queries in mind, the question of a guide can be tackled. The following pages are filled with useful pointers to successful lubrication.



Trouble guide for ball and roller bearing lubrication

TROUBLE	POSSIBLE CAUSE	REMEDY
Noisy Bearing, Vibration	Wrong type of grease or oil	Check lubrication guide.
	Insufficient lubrication	Change to proper grease or oil. Adjust oil-cup to maintain oil level at center of lowest ball or roller. Fill grease housing 1/2 to 2/3 full. Clean vent holes, filters and oil holes.
	Defective Bearing	Check for brinelling, fatigue, wear, groove wobble, poor cage. Replace bearing.
	Dirt	Clean bearing housing, replace worn seals, improve seal arrangement. Eliminate source of dirt.
	Corrosion	Improve sealing to keep out corrosive elements, use corrosion-resisting lubricant.
	Too great internal clearance	Change to bearing with smaller clearance.
	Unbalance	Balance rotor.
	Misalignment	Align by shimming pillow blocks, housings or machines to get bearings and shafts in line.
	Too loose shaft or housing fit	Build up shaft or bore with chrome plate or metallize and regrind.
	Improper mounting	Correct dirty or off-square shaft and housing shoulders and seats. Avoid brinelling caused by pounding on bearing.
	False brinelling	Use vibration mounts for machine to isolate from platform during idle periods.
	Seal rub	Check for metal bearing seal or shield rubbing on shaft, shoulder, or housing.
Overheated Bearing	Inadequate lubrication	Change to proper grease or oil. Adjust oil-cup to maintain oil level at center of lowest ball or roller. Fill grease housing 1/2 to 2/3 full. Clean oil holes, filters, and vents. Use fresh lubricant.
	Excessive lubricant churning	Use thinner oil. Lower oil level to center of bottom ball or roller. Keep grease housing half full; use oil mist.
	Inadequate internal clearance	Use a looser bearing. Allow for differential thermal expansion, reduce interference of shaft and housing fits, correct any housing out of roundness or warping.
	High seal friction	Stretch felt or reduce spring tension with leather or composition seals. Lubricate seals, switch from rubbing seal to low-clearance shield.
	Excessive preloading	Use gaskets or shims to relieve axial preload with opposed pair or with two held bearings on a shaft subjected to thermal expansion. Change design to use only one held bearing.
	Spinning outer ring	Use closer housing fit, use steel insert in soft aluminum housing, use garter spring or rubber holding ring.
	Misalignment	Align by shimming pillow blocks, housings, or machines to get shafts and bearings in line. Align bearing seats and shaft and housing shoulders.
Loose Bearing	Shaft diameter too small	Turn down shaft, chrome-plate or metallize and regrind to proper fit. Retighten adapter to grip shaft firmly.
	Housing bore too large	Build up shaft with chrome plate or metallize and regrind, bore out housing and press in sleeve to give proper bearing fit (a slip fit on od allows for axial thermal expansion of a shaft between two bearings).
Loss of Lubricant	Oil leakage through seal	Adjust oil level to center of lowest ball or roller, replace seal with double-seal arrangement and drain between. Eliminate any unfavorable air flow by baffles and balancing channels.
	Leakage at housing split	Use gasket cement.
	Grease leakage	Pack housing only 1/2 to 2/3 full, use channeling-type grease. Eliminate any pressure causing air flow through bearing. Keep solvents or water from entering and softening grease. Use improved seals.
	Dry, caked residue	Check lubrication guide. Cool oil in external cooler, cool bearing housing, increase oil flow to promote cooling.
Hard Turning of Shaft	Excessive bearing preload	Use less interference fit on shaft or in housing, select bearing with greater internal clearance where heat conduction expands shaft. Relieve axial preloading by housing shims with either two opposed bearings or two "held" bearings on one shaft.
	Heavy seal rub	Stretch felt seals to reduce their friction. Reduce spring tension on leather or composition seals. Scrape out ID or rubber seals, use a shield with shaft clearance.
	Dirt	Clean housing and use fresh lubricant. Replace seals.
	Corrosion	Improve sealing to keep out corrosive elements. Use corrosion-resisting lubricants.
	Lack of lubrication	Raise oil level to center of lowest ball or roller, pack grease housing half full. Check seals.
	Incorrect lubricant	Check lubrication guide.
	Bearing pinching or cocking	Scrape housing bore to relieve pinching. Replace or remachine warped housings, check bearing seats as source of cocking.

Courtesy, Timken Roller Bearing Co.

LUBRICATION LABS not only perform routine specification tests, but also contribute much data to the further evaluation of lubricants for specific jobs. Many of them, of course, are also involved in testing oils and greases for use as coolants, cutting oils, and quenching materials.

The lube lab

MOST LARGE COMPANIES involved with lubrication maintain a lubrication laboratory. The lab determines proper lubricants for the company's own plant, as well as for their customers. Many of them publish lists of approved lubricants for a great variety of applications, and amend and revise these lists, when necessary.

They perform stability tests for greases, high temperature tests, and so on. They run sample analyses of lubricant composition, and rating tests. Other tests that are commonly run include oxidation characteristics, viscosity and color checks under service conditions, as well as the degree of refinement from the crude oil.

Over 300 extreme pressure oil and grease testing machines designed by the Timken Co. for use in their own lab are now in use in many industries.

• **Chain Lube Problem**—Typical of the kind of problems being researched in the country's lube labs is this case history, from the shop of a large wood flooring manufacturer. This problem could have been avoided by having a competent engineer specify the lubrication at the time of installation. Lubrication charts for chains, gearing, engines, motors, or any other power transmission component are available either from the appropriate manufacturers' association or the lubricant companies.

High speed operation threw conventional lubricants from drive chains and sprockets of a 96 in. veneer lathe. Drive chains had to be replaced every three months . . . maintenance and labor costs were high, and costly downtime increased month by month.

The trouble stemmed from using an all-purpose lubricant. It didn't adhere to the chain at high speeds. Hence the chain was unprotected and wore rapidly. Workmen were kept busy continually applying lubricant.

After trying out numerous conventional lubricants, the company decided to use a lubricant that was specially made for problem applications. They chose a tacky, water repellent, heavy duty type designed for use on guarded gears and on open driving chains under wet or dry conditions. Now, the manufacturer reports, throw-off has ended. Annual savings are estimated at $1200.

Technical data from Keystone Lubricating Co.

Use this GREASE GUIDE for ball and

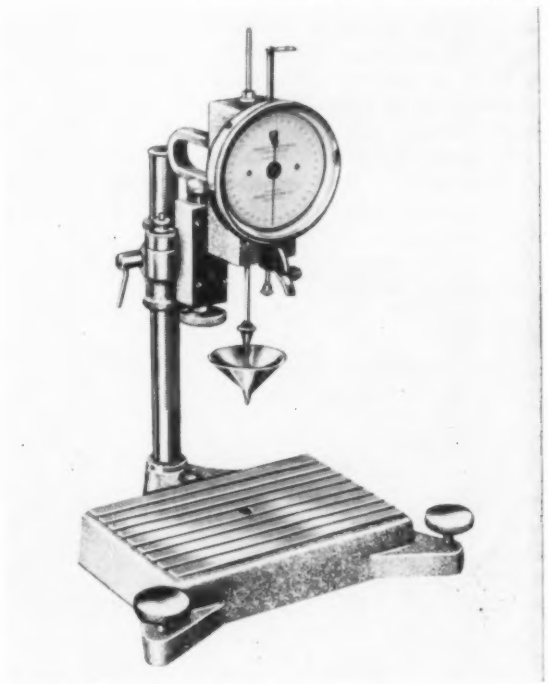
TEST	METHOD	GROUP I GENERAL PURPOSE —40 F to 250 F	GROUP II HIGH TEMPERATURE 0 F to 300 F	GROUP III MEDIUM TEMPERATURE 32 F to 200 F	GROUP IV LOW TEMPERATURE —67 F to 225 F	GROUP V EXTREME HIGH TEMPERATURE—FOR SHORT PERIODS AS HIGH AS 450 F
Penetration, * normal worked	ASTM D 217-52 T	25-35 mm.	20-30 mm.	22-30 mm.	26-32 mm.	25-31 mm.
Oxidation	ASTM D 942-50 Maximum pressure drop	10 psi in 500 hr	10 psi in 500 hr	10 psi in 500 hr	5 psi in 500 hr	5 psi in 100 hr at 250 F
Water resistance	ASTM D 1264-53T Maximum loss	50%		50%	20%	50%
Low-temperature torque	Federal Test Method Standard No. 791 Method 334-T	1 revolution in a maximum of 10 sec at —40 F			1 revolution in a maximum of 5 sec at —67F	1 revolution in a maximum of 10 sec at —40 F
Dropping point (minimum temperature)	ASTM D 566-42	300 F	350 F	300 F	300 F	450 F
Evaporation	Federal Test Method Standard No. 791 Method 351.1 (Maximum)				1.5% in 22 hr at 250 F	4.0% in 22 hr at 400 F
Consistency and stability	ASTM D 217-52T Penetration after 100,000 working strokes	Penetration shall not increase more than 10 mm. Maximum allowable penetration is 37.5 mm.	Same as Group I except maximum allowable penetration is 35 mm.	Same as Group II	Same as Group I	Same as Group I
Dirt content, maximum number of particles per cc.	Federal Test Method Standard No. 791 Method 3005.1	For all Groups 5000 at 5-20 microns 2000 at 20-50 " 50 at 50-75 " None over 75 "				

* *National Lubricating Grease Institute: No. 0—355 to 385 strokes; No. 1—310 to 340; No. 2—265 to 295; No. 3—220 to 250; No. 4—175 to 205; No. 5—130 to 160; No. 6—85 to 115.*

roller bearings

GREASE WORKING MACHINE works grease to desired number of strokes for test.

Photos, courtesy of Precision Scientific Co.



PENETROMETER measures depth of penetration of grease.

A NEW GREASE GUIDE for ball and roller bearings is based on years of practical experience and analysis. Nevertheless, the Anti-Friction Bearing Manufacturers Assoc. cautions that it is a guide, not a law. It's an aid to selection, not a rigid set of rules.

Some greases that conform to test requirements in the guide may not be suitable for all uses. Other greases that don't conform may still be satisfactory for some applications. The guide does not cover bearings carrying extremely heavy loads, or running at high speeds or in excessive humidity.

Experience still counts in picking the right grease. It's a good idea to consult the bearing manufacturer and grease supplier for grease recommendations. This is especially true if the bearing operating temperature will be lower than —20F or higher than 250F.

AFBMA recognizes that the most important consideration is to suit the grease to the operating temperature of the bearing. That is why the guide covers the five most frequently encountered grease groups and their satisfactory operating ranges.

The guide is based on lubricant tests of the American Society for Testing Materials and Federal Test Method Standard No. 791.

Penetration: Measures depth of penetration of grease by a standard cone under fixed conditions of mass, time, and temperature. The guide lists requirements for worked greases because most greases tend to soften with working.

Oxidation: Tested with the oxygen bomb. Determines the pressure drop in psi for a specified time.

Water resistance: Measures percent of grease washed out by water.

Low-temperature torque: Indicates starting torque required by a greased bearing at low temperature. Determines time for one revolution of the bearing spindle at the low temperature.

Dropping point: Measures the temperature at which the grease passes from a semisolid to a liquid.

Evaporation: Determines percent of grease that evaporates at a fixed temperature in a specified time.

Consistency and stability: Measures penetration after long working—100,000 strokes.

Dirt content: Determines size and concentration of foreign particles in the grease.

In addition to tests listed in the guide, several others are recommended. The abrasive matter test employs the method in ASTM D 1404-56T. Tests for free acid and free alkali, fillers, and moisture employ the method in ASTM D 128-57.

Using the Guide

What kind of grease should be used to lubricate a bearing operating at 40F to 250F?

For this temperature range, three greases perform satisfactorily—Groups I, II, and V. Because the upper limit of Group V greases is so high—450F—these greases are more expensive. Group V should not be used. Because the upper limit of Group I greases is borderline —250F—they can be eliminated also. Thus, a Group II grease—0 to 300F—should be selected. ◆

Change lubricant composition to change

TESTS SHOW that lubricant composition can have a pronounced effect on friction. Table 1 summarizes the effective base oils. Table 2 summarizes the effective additives.

Curves for different lubricants show how coefficient of friction is related to contact velocity. They show which lubricant is preferred for friction drives and plate clutches.

A change in base oil raises or lowers the entire coefficient-of-friction vs contact-velocity curve. However, a few base oils increase static friction.

Additives change friction in one of three ways:

- Lower the high-velocity portion of the friction-velocity curve.
- Raise or lower the low-velocity portion of the curve.
- Affect both the low-velocity and the high-velocity portions of the curve.

No additives raise kinetic friction.

Three variables change the sliding friction of lubricated friction drives and lubricated plate clutches:

- Materials used for mating surfaces.
- Type and velocity of motion.
- Composition of lubricant.

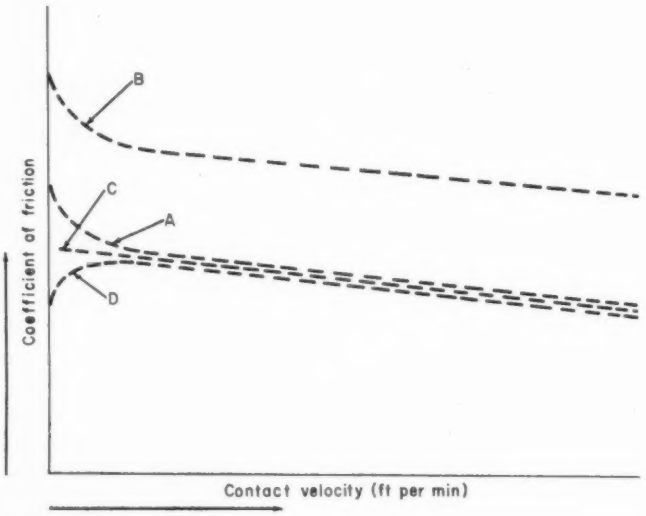
Materials and motion are fixed. But you can often change the lubricant. Generally, aim to keep the kinetic coefficient of friction as high as possible between mating parts.

A bench test machine measured the friction of lubricated steel on steel. The machine simulates conditions occurring at rubbing surfaces in many mechanical devices.

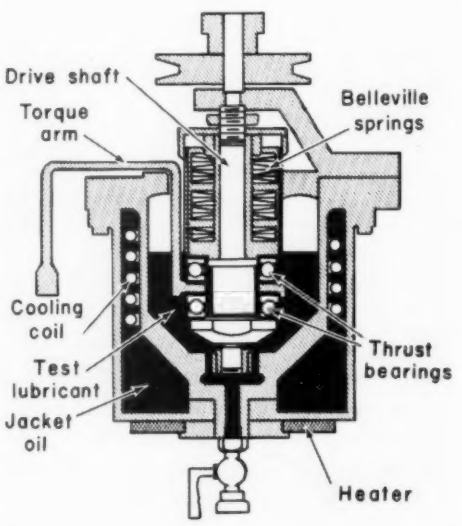
Based on a paper by Fred G. Rounds, General Motors Research Laboratories; presented in the General Motors Engineering Journal

Test elements are two thrust ball bearings. When the bearings rotate under load, the individual balls tend to spin on an axis through the center of the ball. This spinning makes the balls slide on the race, so that both rolling and sliding friction can be measured.

Coefficients of friction determined by test were not the same as values previously reported for pure sliding. However, friction values were comparable to those in various mechanical products. ◆



MOST OILS give curves like A or B. A few oils have curves like C or D. An oil having a curve like B is best for a friction drive. For lubricated plate clutches, oils having curves similar to C or D assure silent and smooth engagement. Oil D allows some clutch plates to slip too much. This damages clutch plates. Thus, oil C is generally preferred for lubricated plate clutches.



BENCH TEST MACHINE measures friction of lubricated steel on steel. Drive shaft transmits torque to the torque arm through the test bearings. The torque is proportional to the coefficient of friction. Compressing the calibrated Belleville springs applies the load. Heating or cooling the jacket oil keeps the test lubricant temperature constant. To test a lubricant, measure torque changes against load, speed, and oil temperature.

friction

TABLE 1

BASE OILS THAT CHANGE FRICTION OF STEEL ON STEEL (Most effective first)*
HIGHER KINETIC COEFFICIENT OF FRICTION
Trifluorochloroethylene Polymer
Fluoroalkyl Camphorate Ester
Napthenic Mineral Oils
LOWER KINETIC COEFFICIENT OF FRICTION
Ethylene Glycol
Glycerol
Diethylene Glycol
Triethylene Glycol
Chlorinated Biphenyl
Oleic Acid
Saturated Fatty Acid (C_{24} est.)
2, 3 Butanediol
Paraffinic Mineral Oil
HIGHER STATIC COEFFICIENT OF FRICTION
Chlorinated Biphenyl
Glycerol
Ethylene Glycol
Diethylene Glycol
Pelargonic Acid
Trifluorochloroethylene Polymer
Methyl Phenyl Silicone

TABLE 2

ADDITIVES THAT CHANGE FRICTION (Most effective first)*
INCREASE COEFFICIENT OF FRICTION (0 to 100 Ft Per Min)
Zinc Diamyl Dithiocarbamate
Cadmium Diamyl Dithiocarbamate
Barium Sulfonate
Barium Phenate
Calcium Sulfonate
(100 to 600 Ft Per Min)
None
DECREASE COEFFICIENT OF FRICTION (0 to 100 Ft Per Min)
Dilauryl Phosphate
Oleic Acid
Stearic Acid
Tallow Fat Diamine
Saturated Fatty Acid (C_{24} est.)
Sulfurized Sperm Oil
Chlorinated Wax
(100 to 600 Ft Per Min)
Bis Beta Chloroethyl Vinyl Phosphonate
Sulfurized Terpene Oil
Dibutyl Phosphite
Dilauryl Phosphate
Chlorinated Wax
Hexadecyl Chloride
Oleic Acid

**Basis of comparison: highly refined, water-white naphthenic base oil.*

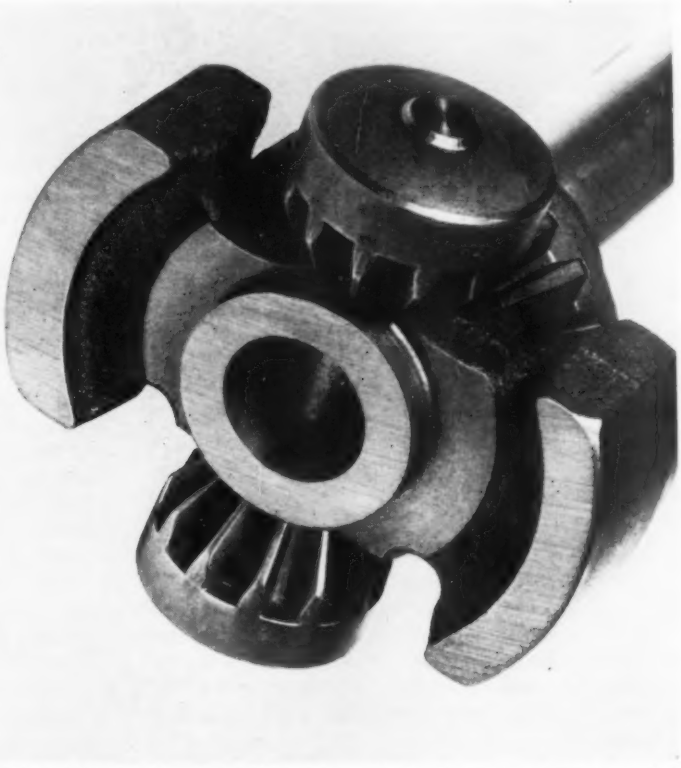
'lube

Built-in lube job for a differential

WHEN COPPER INFILTRATED IRON OILITE was used instead of 1045 steel in a tractor's differential, the new gears were put through a set of severe tests.

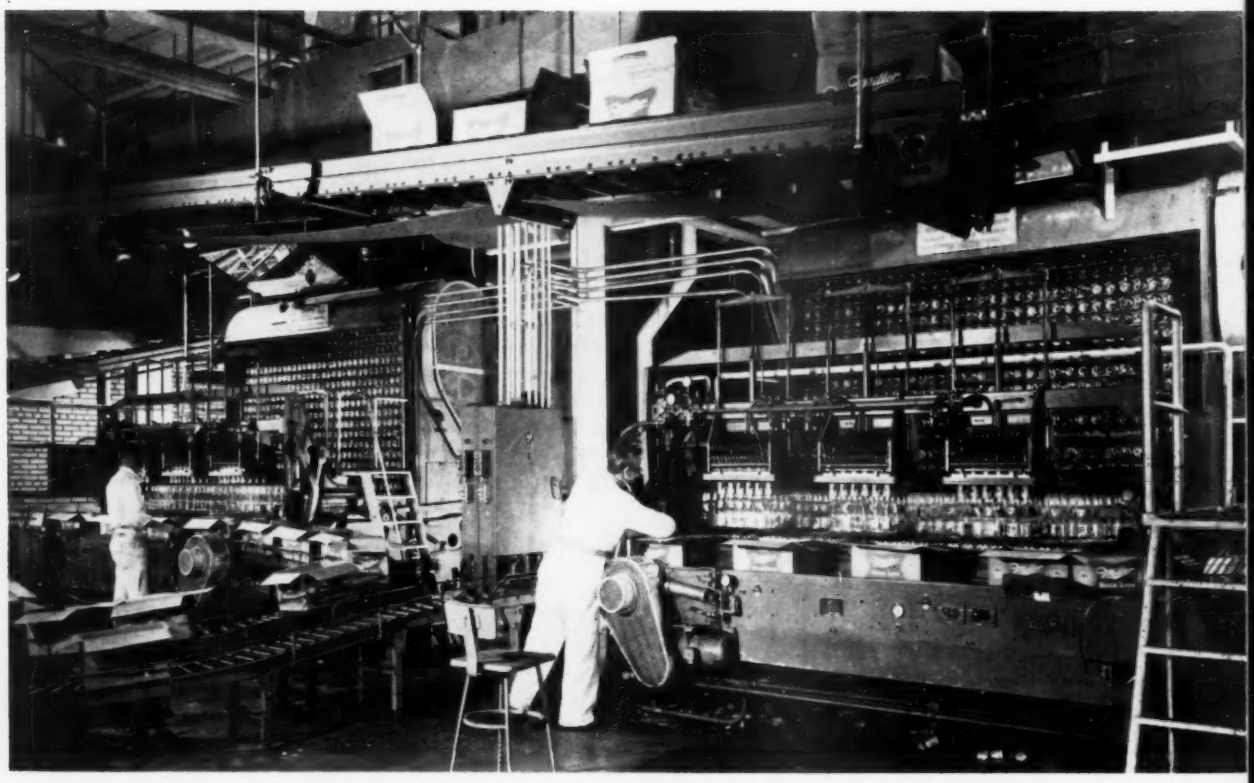
More than just duplicating the strength characteristics of the steel, the new material saved 75 percent of the machining costs for the bevel gears, and 87 percent for the pinions. Oilite is permanently lubricated, oil adsorbent material. Engineers tested strength in two ways. The first test applied severe torque to the drive shaft of the differential. Repeated tests succeeded only in breaking the shaft.

The second test was a field test. In it, the differential was installed in the garden tractor for which it was designed, and 200 lb extra load were added. The 6 hp tractor was driven in a 20 ft diameter circle over severe crevices and ruts. The gears showed no signs of wear. Tractor made by The Indus Corp., Indianapolis. ◆



GARDEN TRACTOR DIFFERENTIAL is lubricated for life. It's as strong as a steel differential that requires regular lubrication. Photo courtesy Amplex Div., Chrysler Corp.

How to stop a chain-driven



EMPTY BEER BOTTLES are removed from cases and released onto a moving table that carries them into the washer.

FOR A POSITIVE STOPPING DEVICE, designers of a case unloading machine put a sprocket on the conveyor shaft. The positive stop pin is the rod of an air cylinder. Getting the stop device to work calls for an electrical interlock system with the conveyor drive motor.

Initially, movement of the conveyor depends on control cams tripping two limit switches. You will understand the movement by following one cycle of locking the conveyor.

Conveyor drive: Suppose the positive-stop cylinder roller is in the locked position (see drawing). The roller locks the sprocket which locks the conveyor.

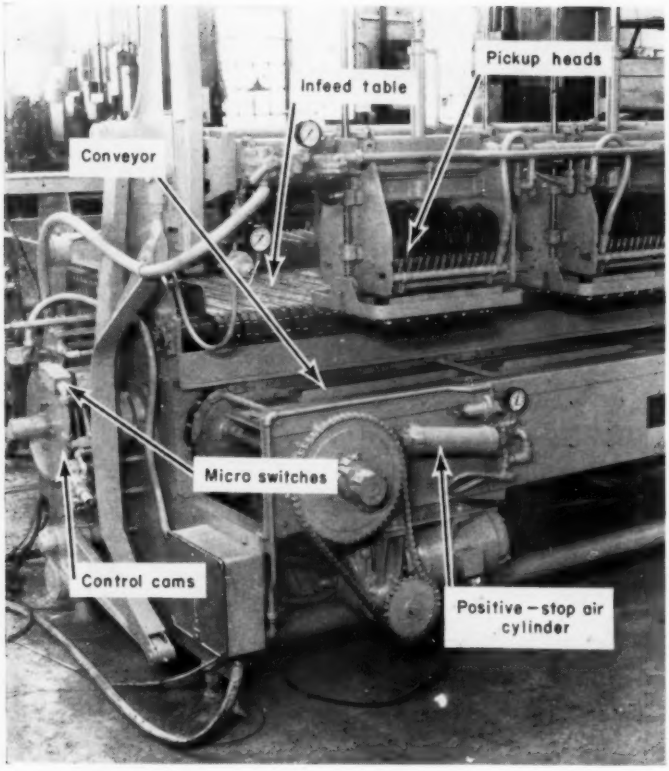
As the machine operates, a switch on one cam is actuated. This closes the circuit controlling the air cylinder. Air pressure in the cylinder exhausts. This retracts the positive-stop roller. The conveyor is free to move.

As the cam advances, the second switch closes. This energizes the conveyor starter. The conveyor motor starts. The cylinder valve remains energized because the first switch still rides the cam segment.

Electrical interlocks: As the conveyor starter energizes, a pair of interlocks close within the starter. These interlocks are auxiliary contact points, normally open when the starter energizes. They are used so the cylinder solenoid valve and the conveyor can still operate after the two cam limit switches drop from the cam segment. The cam switches are not needed again until the conveyor stops and its operation is to be repeated.

The conveyor, now in motion, accepts cases to be unloaded. Just before the cases reach their proper position on the conveyor, a third limit switch (on the conveyor roller chain) opens the circuit. The cylinder solenoid valve and the conveyor starter deenergize. The drive motor stops. The conveyor stops. Air again flows into the positive-stop air cylinder. The positive-stop locking roller locks the sprocket. The cycle is complete. ◆

conveyor



CHAIN DRIVE powers the conveyor moving the cases into position under bottle-unloading heads. Cases must be centered accurately under each pickup head.

HOW THE UNLOADER WORKS

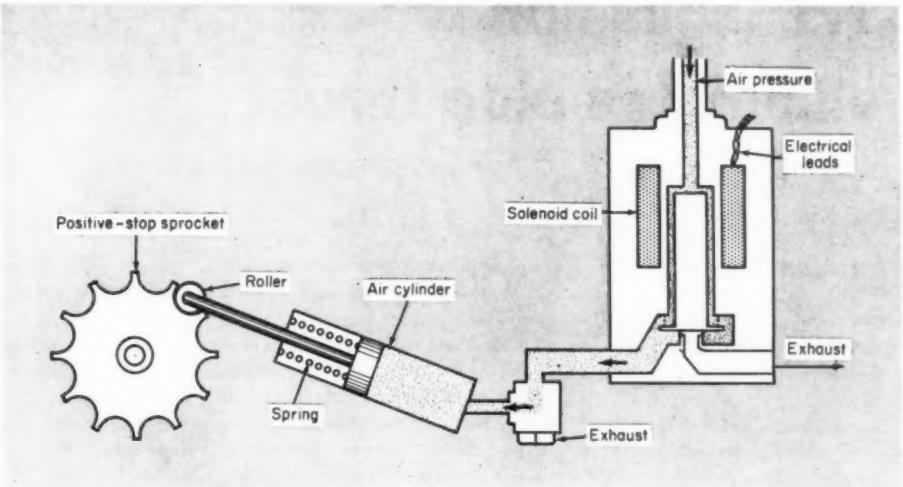
The case unloader removes bottles from their cases and transfers them to the bottle cleaner. The unloader works on air, electrical, and mechanical power. The various methods of power transfer must be synchronized to operate the unloader effectively.

The unloader executes four operations during a cycle:

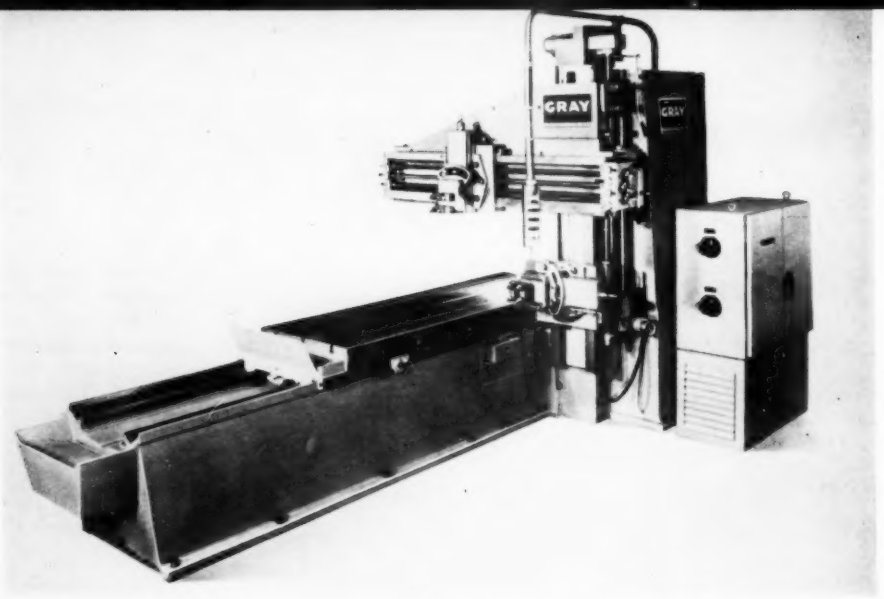
1. *Pickup heads remove bottles from cases.*
2. *The heads move the bottles to the infeed table.*
3. *The heads release the bottles onto the infeed table. (The infeed table chain moves the bottle carriers).*
4. *The heads return to their starting position.*

Before the machine operates, cases must be centered on the conveyor. The pickup heads must be in their lowest position over the conveyor. Also, the bottle pickup head jaws are over the necks of the bottles, but are not gripping the bottles.

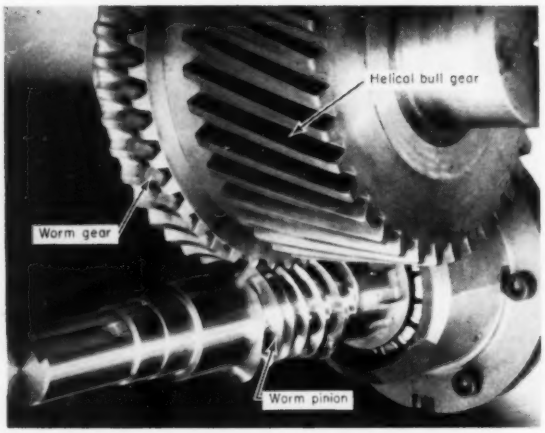
Geo. J. Meyer Mfg. Co., Cudahy, Wis., manufactures the case unloader.



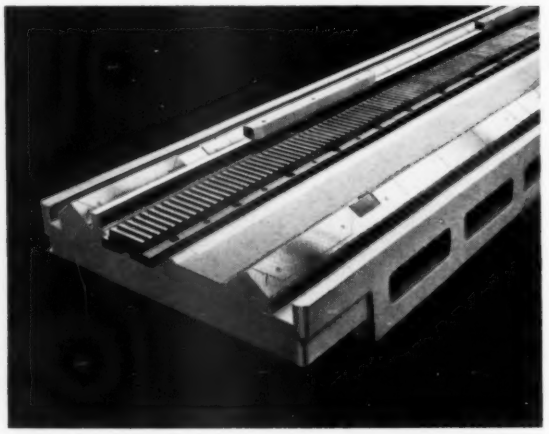
SPROCKET LOCKS when the solenoid coil is deenergized. When the solenoid energizes, air pressure in the cylinder exhausts. This retracts the roller and frees the sprocket.



THIS UNIVERSAL PLANER employs an unusual drive to move the planer table.



CLOSE-UP of bull-gear shaft and motor drive shaft shows overlapping action of gears.



UNDERSIDE OF PLANER table shows rack, which is driven by bull gear.

Transmission eliminates side thrust

AN UNUSUAL GEAR-AND-RACK DRIVE transmits power smoothly and efficiently. It moves the planer table in a universal planer.

A worm pinion drives the worm gear (see photo). This same action turns the helical bull gear which meshes with, and drives the rack.

The rack has a 1½ degree helix angle to avoid the side thrust that occurs with a straight rack. Overlapping action of the teeth between the rack and bull gear produces smooth movement. The bull-gear shaft is short and of large diameter to avoid deflection.

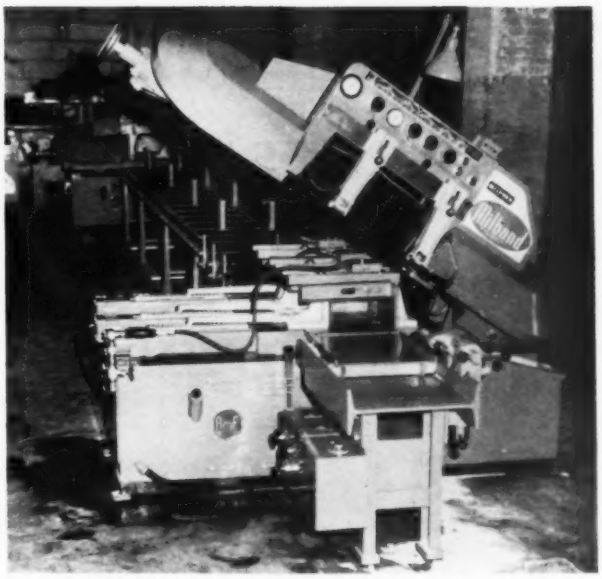
Oil from a large reservoir in the bed lubricates the transmission. The oil circulates through the drive case, holding a temperature only slightly above the shop temperature. The temperature remains the same, even under severe operating conditions.—Planer made by the G. A. Gray Co., Cincinnati, Ohio. ◆

Pivoted sheaves give 9:1 reduction

AN AUTOMATIC BANDSAW BLADE, with cutting speeds of 40 fpm to 360 fpm, needs an unusual drive. A variable-speed transmission unit with pivoted sheaves supplies the power, and is capable of changing speeds up to 9:1.

A double-acting hydraulic cylinder controls the movement of the sheaves. Manipulating a 4-way selector valve on the cylinder varies the hydraulic pressure conveyed to the cylinder.

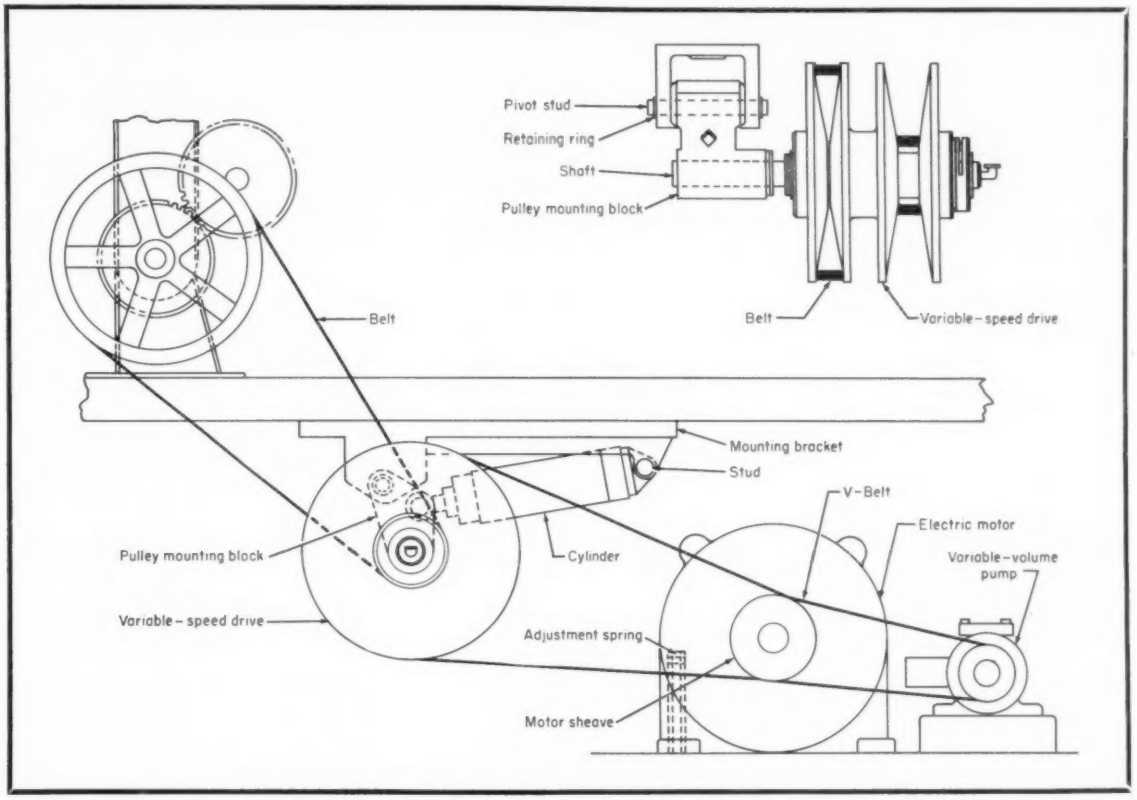
The rod end of the cylinder connects to the fulcrum block supporting the variable-speed sheaves. As the rod moves, the sheaves are forced about a radial arc. This causes a proportional variation in the pitch diameters of the sheaves, and changes the speed of the input pulley driving the transmission. ◆



THIS AUTOMATIC BAND SAW employs the variable-speed drive shown in the drawing.

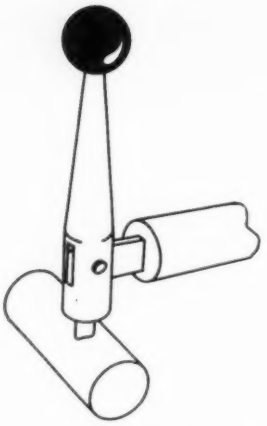
Photo courtesy American Machine & Foundry Co., Brooklyn.

VARYING THE PITCH DIAMETER of the sheaves in this variable-speed drive gives reduction ratios to 9:1.

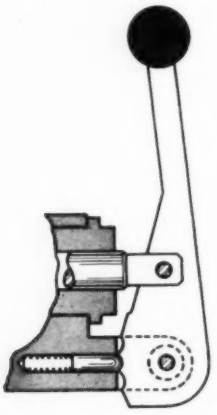


12 handle designs to control power

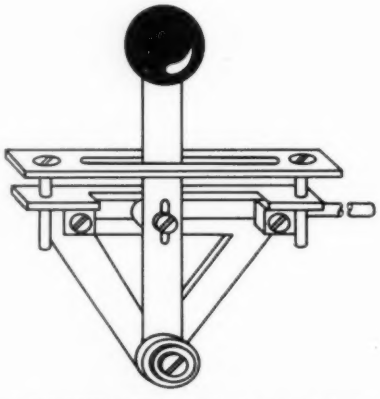
By **GEORGE PHEIL**, *Design engineer, Racine, Wis.*



SIMPLE ECONOMICAL case II, this handle may be cast or wrought. Used where a maximum mechanical advantage is sought, and where there is unlimited space.



SIMPLE FORM of the detent action, used to give a semipositive stop position to the handle's motion. This handle has three stop positions, and is designed for use with a positive-negative-stop hydraulic control system.



A MARINE LEVER designed to eliminate bending and binding of the throttle cable. A neoprene pressure control holds the handle in any position without the aid of notches. The top plate acts as a template, simplifies installation.

IT'S EASY TO OVERLOOK, but the shape of the handle can make your machine a success or a failure. Imagine having a gearshift lever to control the speed of your car. Or an accelerator pedal to shift gears. How many times do we strip threads through using too large a wrench on the bolt? And how easy it is to skin knuckles through using too small a wrench.

How much thought have the handles on your machines had?

Here are some tips on handle selection. The choices are almost infinite, and there is rarely a *right* or *wrong* handle—just a better or worse one.

Every piece of machinery in the power transmission field makes use of the lever. Its usually called a handle, but it can also be disguised as a pushbutton, a wheel, screw, or practically any other mechanical linkage.

All levers fall into three categories, each with its own advantages and shortcomings. Variations are illustrated simply by using

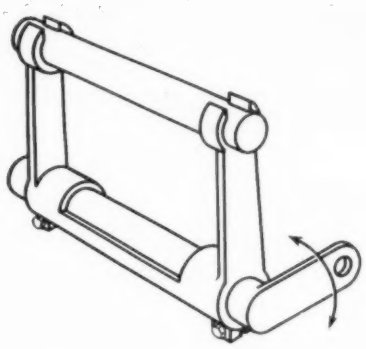
* for fulcrum
w for weight
a for applied force

Case I $\frac{w \quad a}{*}$

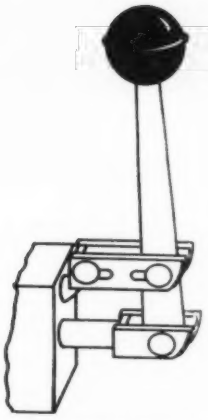
Case II $\frac{w \quad a}{*}$

Case III $\frac{a \quad w}{*}$

Cases I and II offer the user a mechanical advantage, while Case III, rarely used, requires a larger applied force than the load lifted.◆



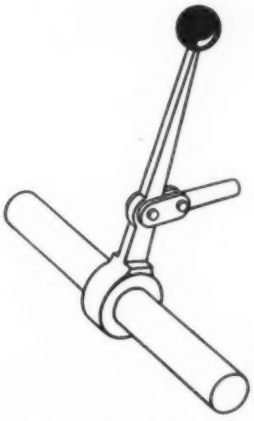
FOR A POWERFUL ACTUATING FORCE, this cast iron handle is ideal. It is usually mechanically operated, and requires a considerable free length of shaft. There must be no restrictions on tightening the capscrews.



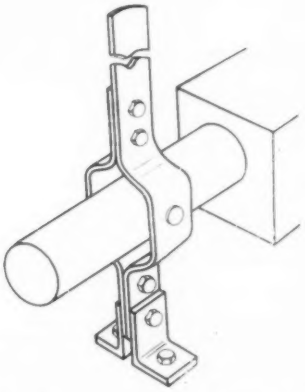
COMMONEST APPLICATION of Case I lever design. This is the gearshift lever. It can be used in awkward or confined spaces by adjusting the holding bolts.

A CAST AND MACHINED LEVER that can be mounted in horizontal or vertical position, where obstructions may be encountered. Only case I levers are readily adaptable to this treatment.

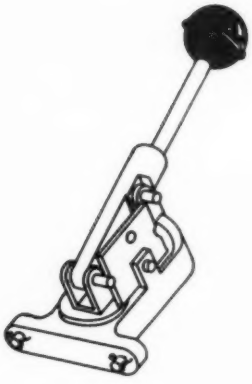
ANOTHER VARIATION on the detent action. Made of steel rod, the handle length can be changed to suit the force requirements of the specific application.



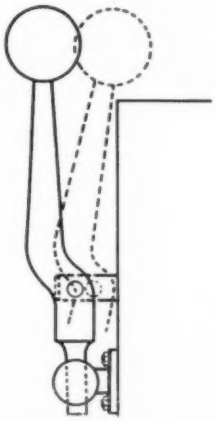
BY USING A DOUBLE LINK, this handle can be adapted to many applications. It can be connected to wire, chain, or cable, for remote control, or to a shaft that can only move axially.



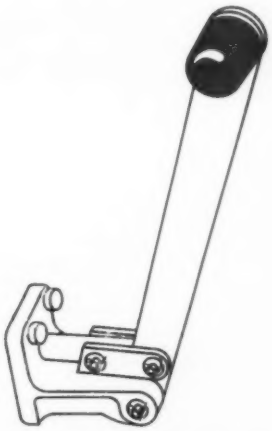
OF STEEL STRAP, this design gives double trunnion engagement over a circular collar. Typical application is a small cutoff clutch for a marine installation.



A COMBINATION of cases I and II, each with the same mechanical advantage. It could operate a 2-pressure control valve, or coordinate two independent motions.



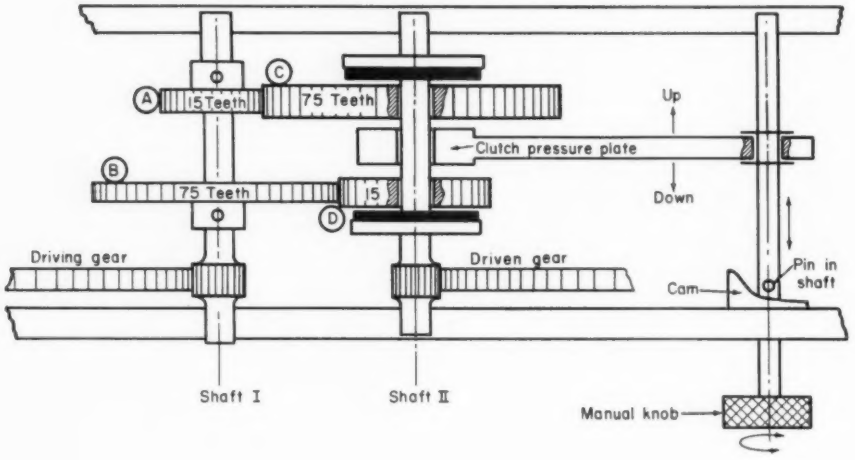
WHEN THE THROW of the handle is restricted by a frame of the machine, a bend in the arm may solve the difficulty. This case is the clutch lever on a lathe.



A **MARINE CONTROL LEVER** (case II), of bronze, with a turned brass handle. Typical applications: on-off valve control, and remote control valve systems.

IDEAS

Miniature speed changer uses double clutch



A MINIATURE SPEED CHANGER quickly turns the counter on a miniature servo when the counter must be reset. The speed changer uses a double clutch to shift gears.

Rotating the manual knob 90 degrees moves the cam pin along the cam slope (see drawing). This displaces the shaft, transfers clutch action from free wheeling to either high or low speed.

Gears A and B on shaft I mesh with gears C and D, respectively, on shaft II. When shaft I rotates with the clutch pressure plate in neutral, gears C and D spin freely. Shaft II is stationary.

When shaft I rotates and the clutch plate is up, shaft II rotates at 1/5 the speed of shaft I. When shaft I rotates and the clutch plate is down, shaft II rotates at 5 times the speed of shaft I. Thus, the speed changer provides a ratio of 25 to 1.

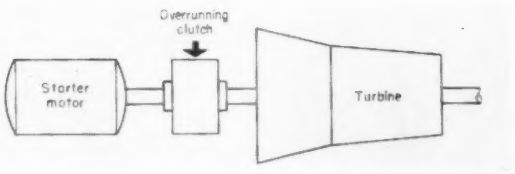
Made by Advanced Designs Inc., Vienna, Va.

Centrifugal clutch reduces wear

A NEW CENTRIFUGAL CLUTCH disconnects the starter motor from a jet turbine after the turbine has been started. The starter motor disconnects as the turbine accelerates to operating speed.

Conventional sprag-type overrunning clutches normally run with their inner and outer races in constant contact. Ordinarily, this causes no measurable wear. In jets, however, turbine speed is so great (to 35,000 rpm) that wear becomes important. Greatest difficulty: The sprags wear out quickly.

Outstanding feature of new clutch: Centrifugal force lifts the sprags completely clear of the inner race at overrunning speed. This prevents abnormal sprag wear.



Formsprag Co., Detroit, is designer and patenter.

Air clutches for sure dual drive

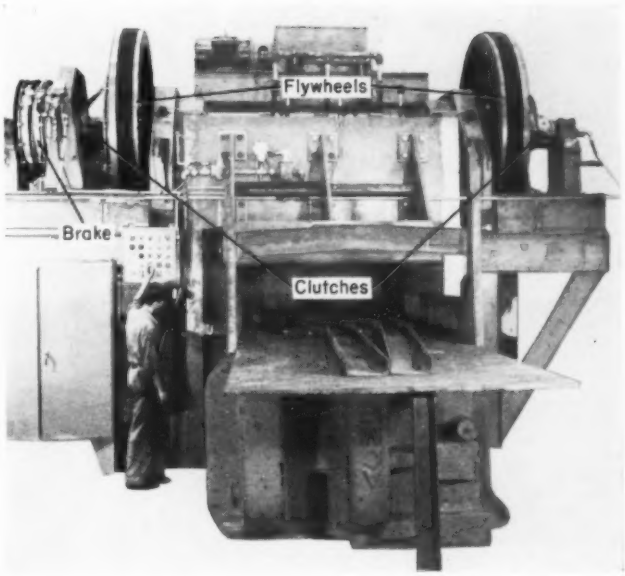
AIR CLUTCHES assure simultaneous application of torque to both ends of a drive shaft for a rotary shear. It uses two 6-ton flywheels to maintain inertia.

Engineers at the Hill-Acme Co., Cleveland, designed their No. 160 Rotary Shear with a dual drive for compactness and high cutting power. It cuts through heavy structural steel sections, with a knife pressure of 505 tons from its 50-hp. drive motor.

Equal torque generation is necessary to prevent distortion and damage to machine components as the massive flywheels start to spin. A solenoid engages each clutch, assuring instantaneous and simultaneous response.

The clutches are ventilated to dissipate heat quickly. They have friction shoes that automatically adjust for wear, and they always maintain contact around 360 degrees of friction surface—assets not easily found in any other type of clutch, the makers say.

For fast stops, an air-actuated friction brake is built onto one end of the drive shaft. ◆



Courtesy Fawick Corp., Cleveland.

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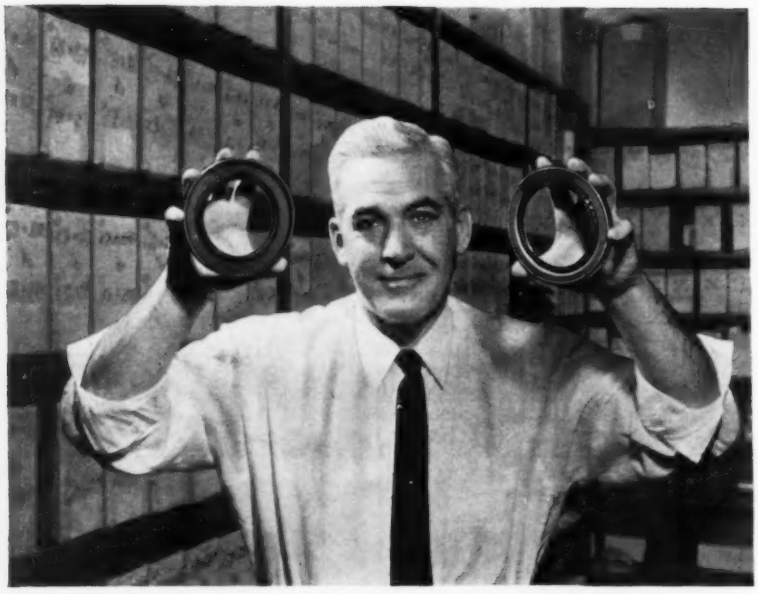
from Your Local Bearing Distributor



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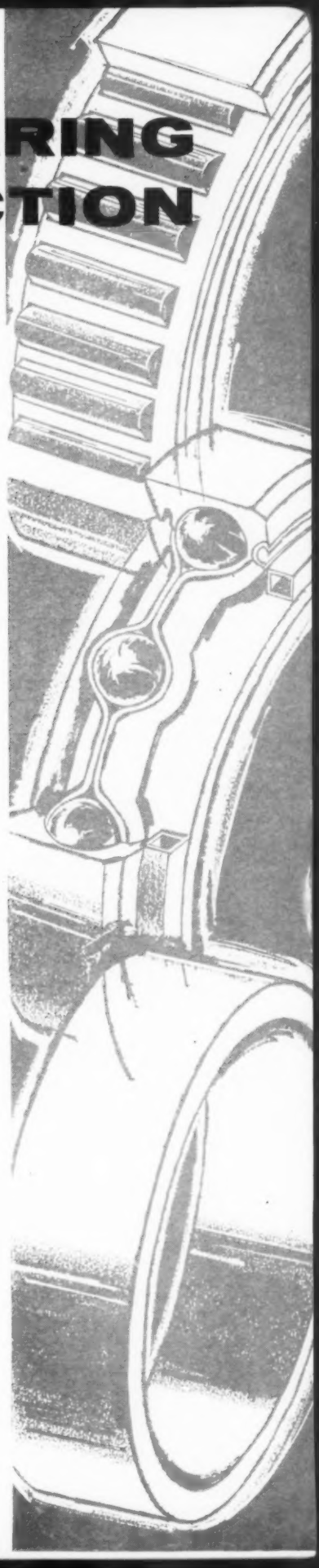
BEARING SECTION

HAROLD BELANGER
bearings editor



Bearing Business

New Hampshire Ball Bearings, Inc.—awarded two Air Force contracts. One valued at $16,100 is for miniature ball bearings for use on bomb navigation systems on B-52 aircraft and fuel flow meters on KC-135 aerial tankers. The other totalling $17,700 is for ball bearings in instruments for F-106 AB jet fighters.

Hoover Ball and Bearing Co.—named **Robert B. Parker** director of materials, and **Gerald A. Graham** production control manager.

Montezuma Bearing Co.—opened a division in El Paso, Texas. **Robert Hunt** will be in control.

General Electric Co's—Industrial Heating Dept. has developed a heater for a bearing in the liquid oxygen pump gear drive in the Air Force Titan missile. The sheathed heating wire fits into machined grooves in the bearing sleeve and prevents freezing of the lubricants.

The Barden Corp.—have patented an electro-magnetically powered ball bearing assembly. It consists of a bearing within a bearing, the outer ring of the inner bearing being oscillated by a built-in electro-magnetic drive. This action keeps the middle ring of the two bearings in motion, cancelling out the friction torque.

The Kaydon Engineering Corp.—recently made **Elbert W. Garrison** chief inspector, quality control. Garrison is a former chairman of the Annular Bearing Engineering Committee.

POWER BEARINGS

Bearings have come a long way since the fire-hardened wooden blocks of the Roman chariots. Not since the introduction of the rolling element bearing, however, has any advance caught the designer's imagination like the development of the hydrostatic—POWER—bearing.

Using a fluid under an externally-induced pressure, the power bearing overcomes many of the disadvantages of the conventional bearing. It has reduced starting friction (stiction), and may lower running friction. By using air, or some other gas as the lubricating fluid, power bearings can operate at virtually any temperature.

In the following two articles, C. R. Adams and E. J. Klovers show the hydrostatic bearing to be versatile and practical.

Worry-free bearing for a

By **E. J. KLOVERS,** *Processing Machinery Dept. Allis-Chalmers Mfg. Co.*

A new kind of lube system for a grinding mill injects the lubricant under pressure. The system was designed for, and was tested on the mill's trunnion bearings. With slight modification, it could be adapted to pivoted-shoe bearings.

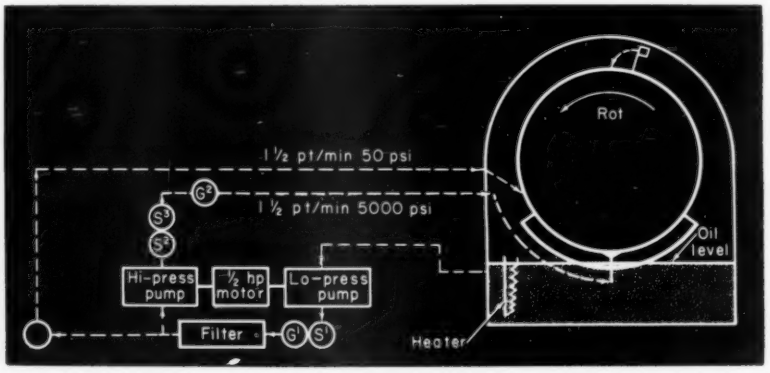
Operating conditions

The mill has sleeve bearings, and the system can be used on bearings from 500 to 2000 sq. in. area, loads up to 400 psi against projected area, and shaft speeds from zero to 10 fps.

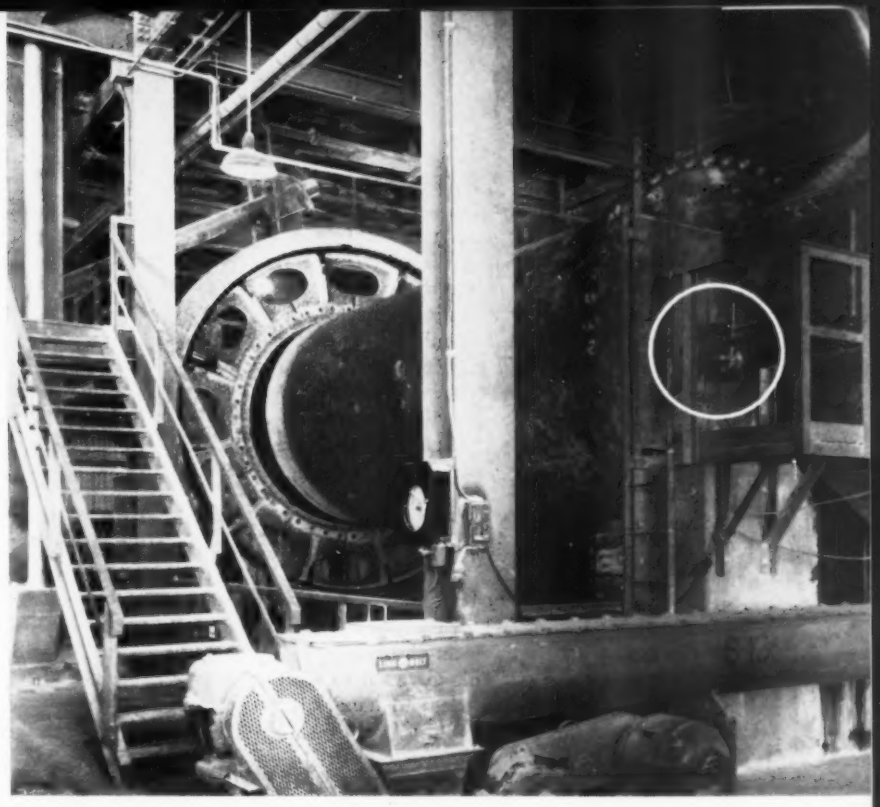
A grinding mill is a rotating cylinder containing either rods or balls as grinding media. A 2000 hp motor drives the mill (illustrated) at 17 rpm. Load reaction on the bearing nearest the gear (R_1), is 220 tons and on the other bearing (R_2), about 210 tons. Bearing areas are about 1400 sq. in. (54 in. diameter x 26 in. long). Load is 300 psi, and shaft speed is 4 fps while the mill is grinding. The introduction of hot material into the mill, expands it about $\frac{3}{8}$ in. The bearing opposite the gear (at R_2) allows axial movement of the mill while the shaft or trunnion is rotating. Within the bearings is an internal oiling system consisting of an oil reservoir and buckets on the shaft. This permits continuous lubrication while the shaft is rotating.

A grinding mill is a rugged piece of equipment—many have seen over 30 years of service. Wearing parts are replaceable and have a predictable life. The sleeve bearing used to be an exception. Some lasted two years (6000 hr per year average) while others lasted for 10 years or more and indicate a potential life of 60 years. Analysis shows that alignment and lubricant are usually satisfactory. Further analysis, however, shows the internal bucket lube system alone to be inadequate when:

1. Starting—the lubricant film is squeezed out from between the shaft and the bottom of the bearing.
2. Oil velocity does not permit proper lubrication by bucket—immediately after starting, when the oil temperature is unusually low.
3. Dirt has infiltrated the bearing oil reservoir—the buckets recycle dirty oil, and invite bearing failure.



grinding mill



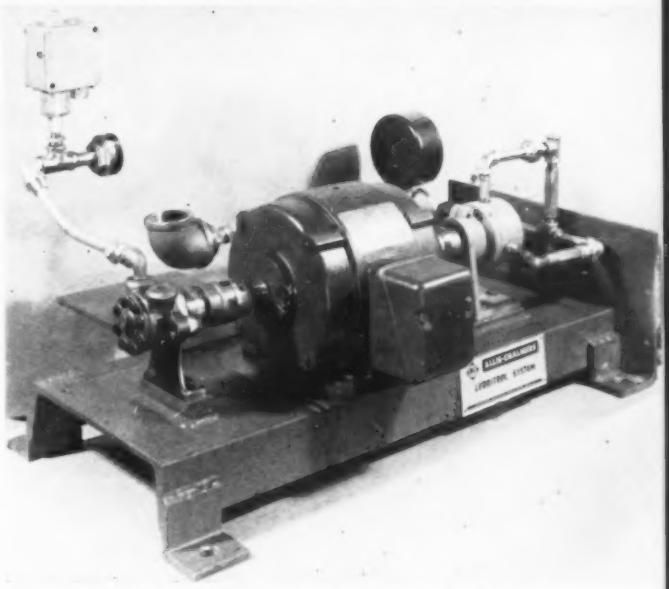
4. Stopping—the mill ceases to rotate, but the grinding media causes it to oscillate (pendulum action) for nearly a minute, through a diminishing arc. During this interval no oil replaces that squeezed from the bearing since the internal bucket is not being rotated. Shaft speeds are under 1 fps.
5. The mill is stopped. Wet grinding mills heat up 20 to 30 F, dry grinding mills often 150 F. On stopping, the mill cools and contracts. This pulls the dry shaft across the width of the sleeve bearing, galling the bearing surface.

Bearing damage could be reduced by injection of cool, filtered lubricant through the center of the bearing, at the bottom. This would float the shaft within the bearing. In fact, a small high-pressure manually-operated pump is often used to float the shaft a few seconds prior to starting. The oil film, so established, cuts bearing wear and motor starting torque.

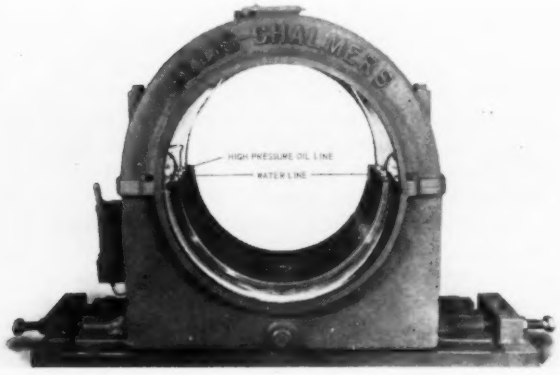
But too often, use of the pump has been neglected. Furthermore, the pump could only eliminate starting friction, not the others. Continuous injection of lubricant answers each requirement except keeping the lubricant clean in the bearing reservoir. In theory, one or two pints of oil per minute can be drawn from the reservoir, filtered and cooled, and forced back directly below the shaft center.

Component Selection

Practically, however, the problem is more difficult. The oil ranges from 1000 to 2000 SSU at 210 F and



GRINDING MILL BEARINGS were of indeterminate life, when ordinary sleeve bearings were used. Installation of a controlled lubricant bearing (a power bearing, in effect), lowered starting friction, stopping friction, and oscillating motion friction. This increased the bearing life, but more important, made bearing life a known factor. Closeup shows the hydraulic system used. Grinding mill is 8 ft in diameter by 22 ft long. Filter element has been removed from the hydraulic system in the closeup.



THE TRUNNION BEARING used is 34 in. in diameter by 15 in. long. It has a bucket for scooping oil from the reservoir and applying it to the shaft once each cycle. A ½ hp motor is used to supply 5000 psi oil to float the bearing on.

pressures at the bearing center occasionally reach 4000 psi.

For control simplicity, a positive displacement pump seemed a logical choice, but there was not one available. So, a hydraulic pump was modified and tested to find the best operating speed. Next, a filter was needed to remove contaminants above 25 microns size. The simplest way to test the filtrate was to introduce cement of about 100 micron. Then the filtrate was thinned with a solvent, centrifuged, and inspected under a microscope to determine the maximum size particle. Because of the heavy oil viscosities and the pressure needed to filter it, none of the filter manufacturers had suitable data. It was a case of testing several to identify a few suitable filters.

The system is shown on p. 36. Part of the system, although not directly a part of the assembly, is a thermostatically-controlled heater in the bearing reservoir. It has a low surface heat value, to prevent buildup of carbon and sludge on the heating element. It is normally used only during a prolonged mill shutdown, to warm the oil. This allows it to filter readily and the internal bucket system to handle it properly when the mill starts.

A low-pressure gear pump was selected to draw oil from the reservoir. The filter is a cartridge type without by-pass. The cooler is optional. It is only needed when the material fed into the mill is unusually hot. All dry grinding mills are furnished with bearings having cooling passageways through them. This cools the oil where it is hottest—immediately within the loaded and unloaded oil film areas.

The high pressure pump is the heart of the system. It must function with 2500 SSU (at 210 F) when oil temperatures are as low as 50 F. It must discharge about 1-½ pints per min at 500 psi, although it rarely operates above 3500 psi. Once the shaft is floated in the bearing, 1000 psi or less will keep it afloat. Depending on the bearing fit, load and oil velocity, the pump elevates the shafts 0.002 in. to 0.009 in.

Two control devices used are: pressure gages, and pressure switches. The switches are used with electrical interlock systems.

The first gage (G1) indicates when the filter cartridge requires replacement. It also indicates breaks or kinks in the suction line, and low oil level in the bearing reservoir. The second gage (G2) indicates low oil level in the bearing reservoir, and kinks or breaks in the high pressure line.

The pressure switches have the same functions as the gages, but they advise of a potential malfunction through an alarm system. An alarm is sufficient for bearings with an internal oiling system. For others, the pressure switches can be interlocked to stop the driving motor.

After laboratory tests, the system was field tested on grinding mill trunnion bearings with a projected area load of 300 psi. The systems are still in operation. They have been so successful that they are furnished as standard on all large grinding mills of 2000 hp or over. They have been furnished as a supplementary system on existing installations where the operator needed an automatic and continuous system. They can be used on any heavily loaded sleeve bearing with slow or moderate shaft speeds. ◆

Only the best for aircraft accessories

by **C. R. ADAMS,** *Research Engineer, Boeing Airplane Company*

Gas bearings have distinct advantages as air speed increases and the space allotted to accessories drops.

Aircraft of the near future will have to use special bearings and lubricants. Studies have shown that for some accessories—landing gear or aileron drives, for instance—only gas bearings will work.

Variations in aircraft operating conditions, available gas supplies, and permissible envelope size will make tailored bearings mandatory. For this reason further research in gas bearing design and application will be required. Example: What is the most practical source of air or gas to pressurize the bearing?

Pressure sources

One source of pressure for gas bearings in aircraft equipment is engine bleed air. During a typical flight there are times when this pressure is low, but it could be boosted by a turbocompressor.

Rocket propelled vehicles could use gas generators to supply pressure. In turbine driven equipment, gas bearings may exhaust directly into the turbine nozzles. A compact, short-lived bearing could use gas from a generator installed in a hollowed-out drive shaft.

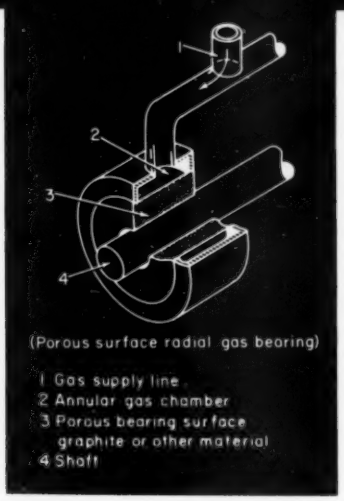


FIGURE 1. This conventional air bearing uses a porous bearing surface of graphite or other material to supply the lubricating film of gas.

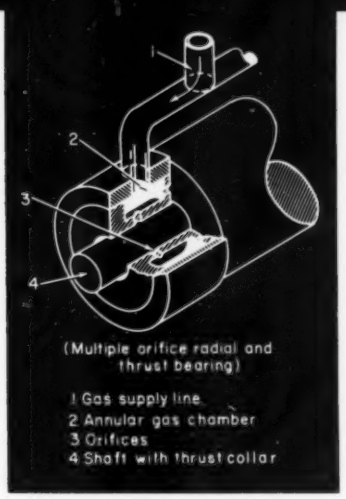


FIGURE 2. A multiple-orifice air bearing provides pressure for lubrication through small openings from its annular gas chamber.

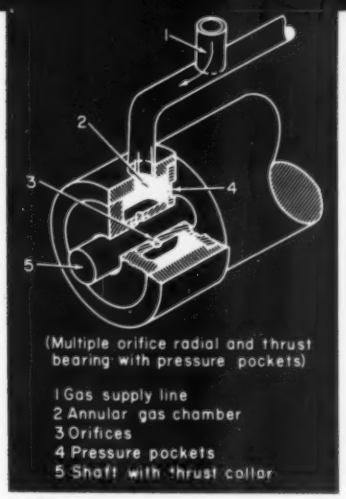


FIGURE 3. Pressure pockets in this radial and thrust bearing prevent the gas orifices from being smeared shut should the shaft and bearing surfaces rub.

Consider gas filtering. It's relative importance depends on the type of bearing, its life, and its application. Centrifugal force-type gas cleaners have high temperature and pressure possibilities—but certain applications render them ineffective.

The Boeing Airplane Co. has developed a gas bearing that eliminates the standard orifices and pockets usually designed into these units (See Figure 3). In fact, a plant can make them by simple machining methods.

This bearing uses a double od on the shaft and a straight sleeve on the bearing surface—or a straight shaft with the bearing surface having two id's. This stepped shaft localizes galling and prevents complete seizure when there is intermittent rubbing.

Gas is fed into the cavity between surfaces and bleeds out of the end of the housing. Bearing effectiveness depends on the two clearances between the shaft and bearing to restrict flow and produce the pressure differential which floats the shaft.

Avoiding the orifices and pockets reduces production cost and increases reliability. Further, the gas need not be as clean as in other types because contamination is given a wide path for escape.

Advantages

Maintaining shaft stiffness at high temperatures usually requires a large shaft diameter. This is no disadvantage for gas bearings because they increase in load-carrying ability as shaft diameter increases. Hence lower gas pressure could be used, in such a situation, to support the same load.

While it is possible to make rolling element bearings or gas bearings of materials with the same coefficient of thermal expansion as the shaft and housing, it is difficult to assure a uniform temperature distribution. This can lead to binding, or severe straining of the bearing or shaft. The gas bearing, however, has fewer of these parts to cause trouble.

Extremely low friction is another advantage. Power loss from the bearing is negligible over the entire temperature range. Speed need not be a primary consideration with gas bearings although it must be given a priority in the selection of conventional bearings.

Machines with gas bearings should be capable of starting without waiting for pressure to build up in the bearing. Dry-lubed, hardened surfaces may be used for starting and stopping. For simplicity, bearing pressurization should coincide with machine starting.

A question that still requires considerable development is how to obtain satisfactory high speed gas bearing shutdowns after loss of gas pressure. This will involve special shaft and bearing treatment. ◆

FIGURE 4. A step-bearing installation on a turbine-driven pump. This bearing runs with air or water supplying the hydrostatic pressure to support the shaft.

POWER TRANSMISSION DESIGN

FREE REFERENCE MATERIAL from this month's ads

Readers may obtain any of these reference materials by circling the numbers on the reader service cards.

2. TRANSMISSIONS—Airborne Accessories Corp. offers Catalog IR-61, covering design and accessories of a versatile rotating transmission.

4. PLASTIC SEALANT—American Sealants Co. is giving a free sample, plus literature, of Loctite liquid sealant.

6. LUBRICANT—Alpha-Molykote Corp. offer free sample and information, on Molykote M-88 anti-sieze lubricant.

7. DIHEDRAL COUPLINGS—Ajax Flexible Coupling Co. detail their line of flexible couplings in performance data sheets.

10. SPEED REDUCERS—Cone Drive Gears Div.'s Bulletin CD-218 tells all about fan cooled and worm gear reducers.

11. CUSTOM GEARS—Cincinnati Gear Co. Brochure covers custom gears in all types to 72 in. diam. cut teeth, 39 in. shaved, 25 in. ground.

12. AIR CLUTCH—Conway Clutch Co.'s bulletin describes the Stationare clutch.

13. SPROCKETS—Dayton Rogers Mfg. Co.—Darco Sprocket Catalog No. 2 covers standard and special types.

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29. MINIATURE CHAIN—Sierra Engineering Co.'s new catalog contains application data, specifications, tables and sprockets sizes on miniature chain and sprockets.

34. FLEXIBLE COUPLINGS—Thomas Flexible Coupling Co.—New Engineering Catalog 60 includes details and performance figures on all-metal flexible couplings.

16. CENTRIFUGAL CLUTCHES—Formsprag Co. describe their line of centrifugal clutches and clutch couplings in a catalog.

20. AIR CLUTCHES—Horton Mfg. Co., Inc.—Brochure gives the details on the Air-Champ combination clutch and sheave.

24. DRIVES—Maurey Mfg. Co. offer catalogs and manuals on various types of belt and roller chain drives.

25. GEARS—Micro Precision Gear & Machine Corp.—12 page booklet highlights engineering and production facilities.

26. CLUTCH AND BRAKE—Minster Machine Co.—OEM Clutch Bulletin 16 has all the necessary information on combination air friction clutch and brake unit.

31. DISC BRAKES—Stearns Electric Corp. give details of 7 sizes of automatic self adjusting disc brakes in New Product Preview 3-61-B.

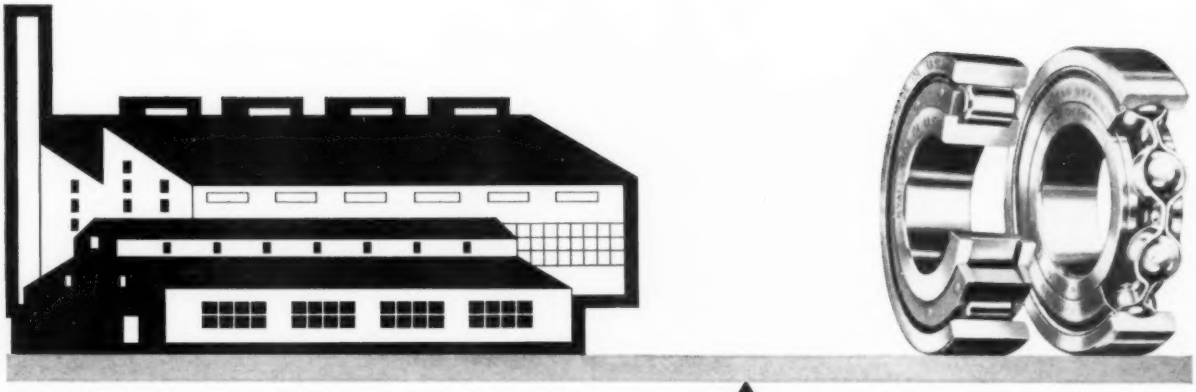
35. PILLOW BLOCKS—Triangle Mfg. Co. literature describes various types of self aligning, self lubricating, sleeve type blocks.

37. CLUTCH-PULLEY—Warner Electric Brake & Clutch Co. have literature featuring an electro-sheave clutch package.

38. DRIVE SHAFTS—H. S. Watson Co.—new 8-page engineering data bulletin F-15a gives the details on 9 sizes of 10-to-300 hp shafts.

40. LUBRICANTS—Whitmore Mfg. Co. offers free samples of open chain lubricant and also samples of a general anti-friction composition.

YOUR BUSINESS IS IN THE BALANCE . . . and bearing failures can work against you. That's why it's important to specify New Departure ball bearings and Hyatt roller bearings for the machinery in your plant. They provide significant performance reliability, the kind of worry-free, trouble-free service that helps to cut costs and keep maintenance to a minimum. Together N/D and Hyatt are the world's largest manufacturer of bearings. With nearly 30,000 original equipment customers, they supply bearings for virtually every type of industrial equipment in use today. These high quality, durable bearings are readily available to you through the national network of N/D-Hyatt Industrial Bearings Distributors . . . who are backed up by United Motors Service bearings warehouses across the country. So when you replace bearings, be sure you get the best fast. Specify these reliable high-performance bearings from your Authorized New Departure and Hyatt Industrial Bearings Distributor.



New Departure and Hyatt bearings are supplied through U-M-S Authorized Industrial Bearings Distributors

HYATT NEW DEPARTURE

Circle **36** on Reader Service Card

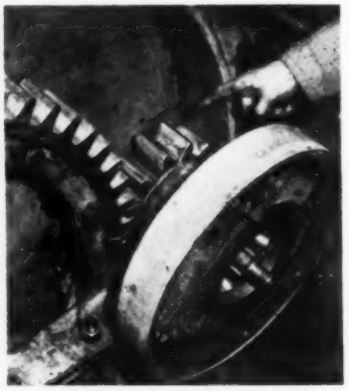
PROGRESS IN METALS

Hard-surfacing alloy cuts gear costs

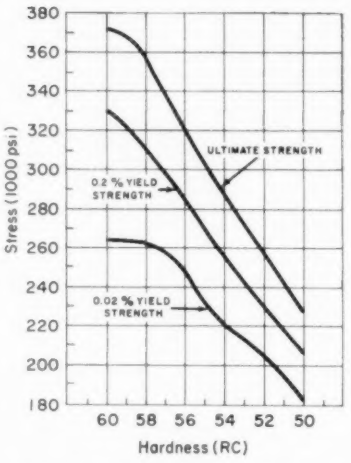
Hard-surfacing the pinion drive gear of a Galion asphalt paving roller greatly increased the service life of the gear. Normally, the gear had a life of about one year. With hard-surfacing, the life was extended to at least five years. Maintenance costs practically vanished.

The hard-surfacing alloy is a nickel-base material containing chromium borides as well as the chromium carbides found in most hard-surfacing materials. The builders apply the alloy to the gear teeth by oxyacetylene welding. The alloy requires no finish machining and is put into service as-welded. Cost of reclaiming a worm pinion gear with the alloy is 11 percent of the cost of a new gear.

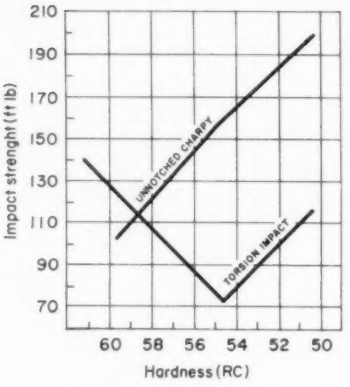
Wall Colmonoy Corp., Detroit, is a source for the alloy.



HARD-SURFACED PINION drive gear in Galion asphalt paving roller.



TENSILE AND YIELD STRENGTH as a function of hardness.



IMPACT STRENGTH vs. tempered hardness.

Other advantages: High toughness, good machinability, low hardening temperature.

Specific applications: Hobs, heavy-duty punches, mandrels, and dies.

New steel for hobbers

A high strength tool steel can be heat-treated to a tensile strength higher than 350,000 psi. The steel, Carperter Hi Shock 60, retains high impact strength and ductility at this high tensile-strength level.

Ultrasonics ups gear hobber life

An ultrasonic treatment lengthens the life of steel parts by as much as 150 percent.

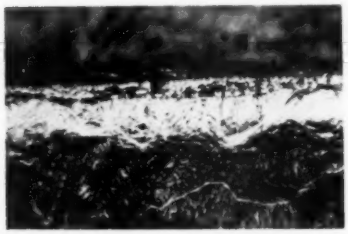
The developer is Atom Steel

Co., Cleveland. The National Tool Co., is using the new steel in gear hobbers.

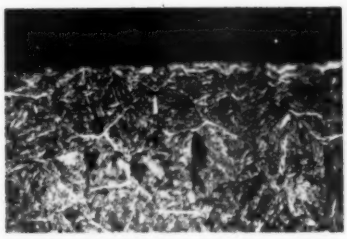
Anton Erhardt, chief engineer at National Tool, says: "The process is not a heat treatment because the steel does not change temperature. Furthermore, it is not merely a surface treatment. The treatment . . . stress-relieves the steel throughout its volume. Our hobbers now are lasting 25 to 150 percent longer."

Heat-treating eliminates grinding

A new heat-treating process removes the white layer from nitrided steel parts. Aircraft gears and bearings are examples of nitrided parts. The patented process, developed by National Broach & Machine Co., Detroit, completely eliminates the need for grinding to remove the white layer and also increases case depth.



WHITE LAYER on nitrided steel part. Magnified 500 times.



THE SAME PART after treatment. Magnified 500 times.

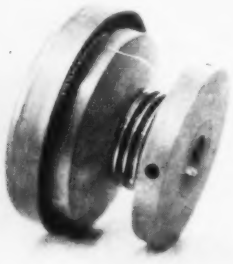
The process consists of coating the nitrided part with an impervious heat-resistant material and heating it under controlled conditions. ◆

PRODUCT NEWS

To get complete information on these products, use the Reader Service Cards bound into this issue.

Automatic clutch

For single-cylinder engines developing 3½ to 6 hp, Model 18C6B26 enlarges the range of this line from ½ to 9 hp. Simple 4-part construction—cover with



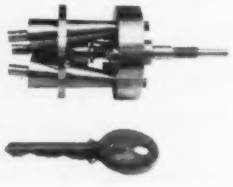
support tube, governor, moveable half of the pulley and fixed half. Clutch is installed by slipping it over the engine drive shaft and tightening with a key wrench.

V-Plex Clutch Corp., Hagerstown, Ind.

Circle **200** on Reader Service Card

Midget variable drive

This new infinitely-variable transmission is for instrument and light power applications to ⅛ hp. Three types: any maximum to 0; maximum to 0 and into full reverse without change of input speed; and "speed correction"—output speeds vary approx. ± 10% from



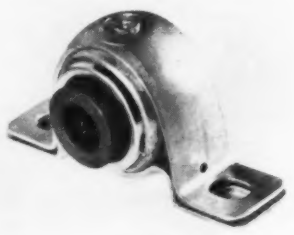
a set input speed. The drive is a compound planetary system with a non-rotating traction ring that engages tapered rollers at varying diameters. Speed changes when the ring is moved lengthwise. Serves also as an overload clutch or torque multiplier.

Graham Transmissions, Inc., Menomonee Falls, Wis.

Circle **201** on Reader Service Card

Sleeve pillow block

This design uses a sintered bronze stationary bushing inside a die cast zinc housing, with space between for a reservoir of Permawick lubricant. Inside this is an integral hardened steel rotating sleeve. The bearing makes use of the tendency of sintered bronze to cold flow and compact in the area beneath the load, while the



rest of the bushing remains porous to maintain the oil flow. Slingers and thrust washers on the sleeve stop leakage, keep oil circulating. Three bores, ½, ⅝, and ¾ in., strap or flange. Load capacity about 50 psi at 1750 rpm or more.

Congress Drives Div., Tann Corp., Detroit, Mich.

Circle **202** on Reader Service Card

Induction motors

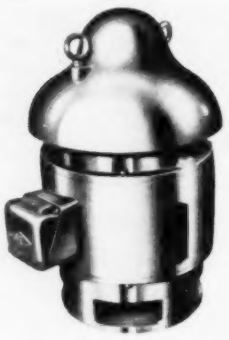
A full line of Schorch induction motors, built to re-rated NEMA frames, imported from West Germany. Both totally enclosed and open drip-proof models, drip-proof from ½ to 200 hp, enclosed from ½ to 100 hp. Operating temperatures correspond to insulation class B. Stator windings impregnated with epoxy for complete corrosion and water-resistance.

George Von Opel Corp., New York, N. Y.

Circle **203** on Reader Service Card

Vertical pump motor

Windings of this hollow-shaft motor are impregnated with varnish and baked into a single solid mass. Special grease fittings directly feed each bearing. For



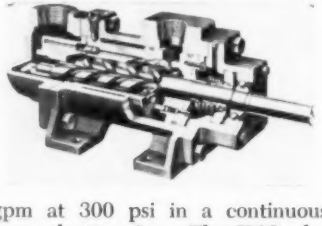
standard, medium and heavy thrust, depending how far the water must be lifted. Rated from 1 through 30 hp in frame sizes 225 through 326U. Solid shaft types 1 through 60 hp, in frame sizes 182 through 365U.

Reuland Electric Co., Glendale, Calif.

Circle **204** on Reader Service Card

Rotary screw pumps

Used on Navy ships as a lube oil and fuel oil pump, standard IMO pumps work well at speeds to 12,000 rpm and deliver up to 3,000



gpm at 300 psi in a continuous non-pulsating flow. The IMO also handles fire-resistant fluids, such as water glycols.

De Laval Steam Turbine Co., Trenton, N. J.

Circle **205** on Reader Service Card

Self-lubricating chain

The MSL line of self-lubricating power transmission and conveyor chains now comes with a 1 in. pitch, American Standard #80. Single, double, triple and quadruple strands in riveted or cottered

type. Average ultimate strengths from 13,000 lb in single strand to 52,000 lb in quadruple strand. The oil-impregnated sintered steel bushing exudes oil while the chain is working and reabsorbs it when it stops.

Whitney Chain Co., Foote Bros Gear & Machine Co., Chicago, Ill.

Circle **206** on Reader Service Card

All-purpose lubricant

B-F Molylubricant Spray is a solid molybdenum disulphide compound dispersed in microfilm particles. It dries to form a non-conductive film stable from 300 to 700 F. Unaffected by salt water, most acids or alkalis.

Chemical Products Div., Bridgeport Fabrics Bridgeport, Conn.

Circle **207** on Reader Service Card

Idler pulleys

This new line of idler pulleys are designed for use as belt tighteners, clutches, belt guides etc. The pulleys consist of symetrical sheave halves spot-welded together around a double row ball bearing. Flat or V-belt types. An ex-

tended inner race on one side does away with spacers and gives mounting clearance. Bearing bores fit standard machine bolt sizes or integral threaded stud can be supplied. Bearings are grease prelubricated and sealed.

New Hampshire Industries, Inc., Hanover, N. H.

Circle **208** on Reader Service Card

Rotary torque actuator

New design has full cushioning as a standard feature and provides 0 to 370° of high torque rotation. Powered by air, gas, water or oil, the actuator seals dead tight and will not back off under tension, shock, vibration, or complete

PRODUCT NEWS

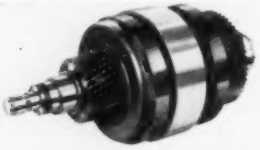
power failure. May be stopped at any point in the rotation cycle. Standard rotation cycles (0-100°, 0-190°, 0-280°, and 0-370°). Bore sizes of 4, 5, 6, 8, 10 and 12 in., rotary torque output from near zero to 15,000 in. lb depending on bore size and input pressure. Standard and special mounting styles.

Carter Controls, Inc., Lansing, Ill.

Circle **209** on Reader Service Card

Hydraulic clutches

New Power Shift clutch line offers automatic torque modulation for a wide variety of transmissions.



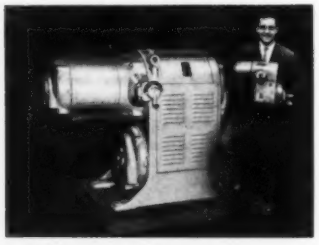
Six sizes handle torque loads from 1000 to 10,000 ft lb, engines up to 1000 hp and speeds up to 5,500 rpm. The design features pressure-balanced drives and built-in lubrication. Intended for off-highway vehicles, track layers marine gears, machine tools, etc.

Rockford Clutch Div., Rockford, Ill.

Circle **210** on Reader Service Card

Variable speed drive

The new 100 hp dual belt Varidrive extends this line from ¼ to 100 hp, with units of 50, 60, and 75 hp. Single belt types from ¼



to 40 hp. Speed increaser gearing may be integrally mounted on units to 100 hp. Usual variety of controls.

U. S. Electrical Motors, Inc., Los Angeles, Calif.

Circle **211** on Reader Service Card

Recirculating ball nut

This limited space design shows a reduction of 20% (from 0.500 to 0.400) in the OD compared to old model. The nut is shown on a

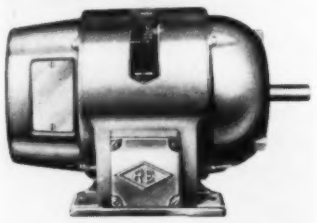
ball bearing screw assembly with a ball circle diameter of 3/16 in., fitted with balls 1 mm in diam. Compact design eliminated need for a return tube.

Saginaw Steering Gear Div., General Motors Corp., Saginaw, Mich.

Circle **212** on Reader Service Card

Wound rotor motors

New frame sizes in this line now come as small as 182 through 326U. Frames are aluminum alloy.



Construction is either drip-proof or totally enclosed with horizontal, ceiling or side wall mounting. Standard hp ratings from ½ through 40 hp, plus the following intermediate hp ratings: 2½, 4, 8¾, 12½, 17½, 22½, 27½, 32½, 35 and 37½.

Reuland Electric Co., Alhambra, Calif.

Circle **213** on Reader Service Card

Linear actuators

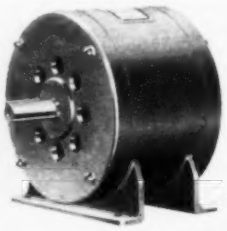
The new LA-11 and LA15 provide precision stroke control from 1½ to 30 in. in proportional response to a control signal from a dial, Clip Card, punched tape or other input. Thrust capacities to 300 lb, stroking rates from 5½ to 240 in. per minute. Built-in-brake standard on some models. Optional features include limit switches, special transducers, explosion proof enclosure and a bellows-type boot protector for the rack. Single and two phase types, mounting by foot, face or bracket. Standard accuracies up to 1 part in 1000 but "coarse fine models" provide resolutions to 1 part in 30,000.

Jordan Controls, Inc., Milwaukee 9, Wis.

Circle **214** on Reader Service Card

Improved low speed generator

Improvements in the Nobrush 60 cycle, 1200 rpm generator double its capacity without increasing size and weight. It now delivers .5 KVA, 3 phase, 60 cycles. (for-



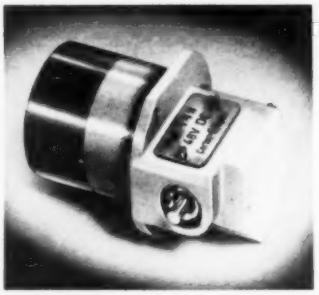
merly .25 KVA). Dimensions of the generator 6¾ in. long, 10½ in. wide, by 9 in. high. Weight in welded steel construction is 50 lb.

Georator Corp., Manassas, Va.

Circle **215** on Reader Service Card

Miniature gearmotor

Miniature fhp model PM-148 replaces model CO843. It is improved by an additional armature bearing. The motor is permanent magnet dc type. Six models, for



input of 6, 12, 24, 28, 32, or 48 vdc. Double gear reduction, output shaft speeds of 10 to 100 rpm with max. torque of 50 in. oz. Overall size is 2¾ x 2 in.; weight 9 oz.

Carter Motor Co., Chicago, Ill.

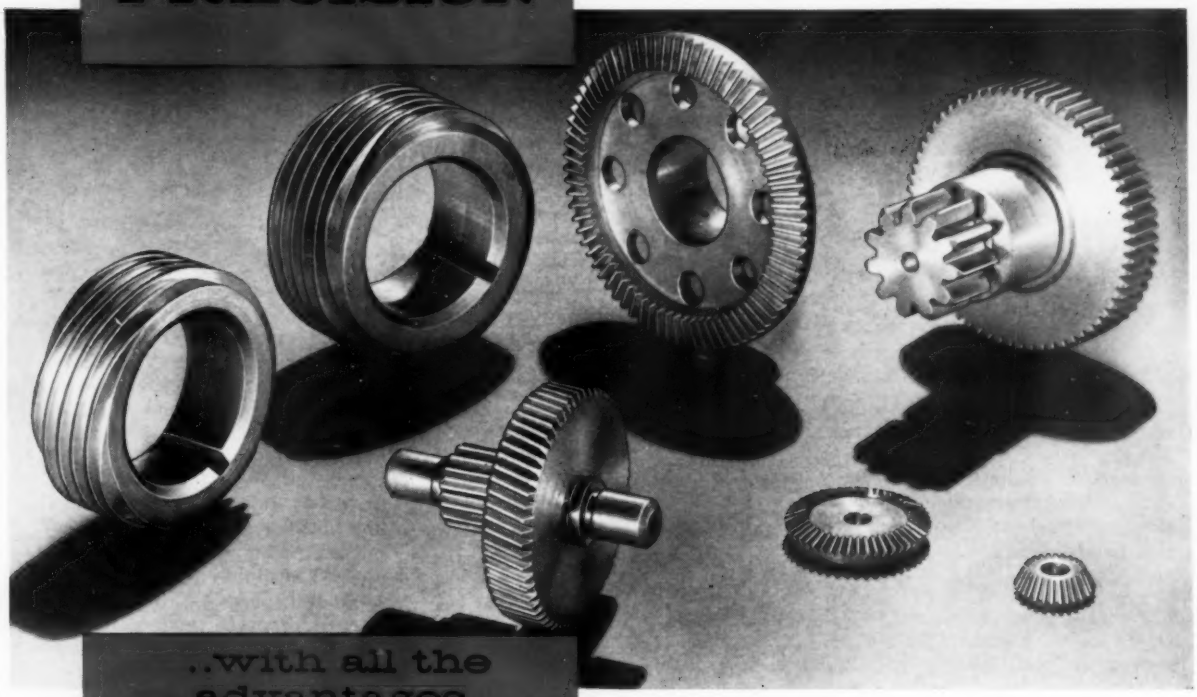
Circle **216** on Reader Service Card

Breather vent with lift ring

This accessory, for gear cases or similar machinery enclosures, provides for venting of the casing combined with a lift ring. Breather

Gears from MICRO PRECISION

Specialized Facilities for Volume Production of Fine and Medium Pitch Gears . . . Sizes up to 4" Diameter.



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Circle **25** on Reader Service Card

PRODUCT NEWS

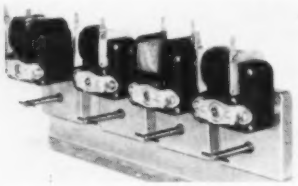
vent holes in the threading eliminate drilling and tapping needed for a separate lift ring. The Lift-Vent is a forged steel ring attached to hex heads machined from bar stock. All-metal filter mesh. Variety of sizes and threads.

Technical Development Co., Glenolden, Pa.

Circle **217** on Reader Service Card

Gear motor assembly

Individual gear motors are assembled and fastened to a stamped steel mounting plate. The plate



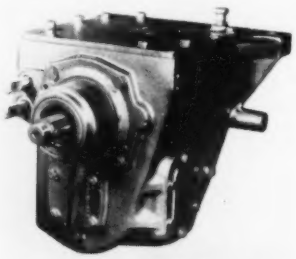
also serves as a cover for the die cast gear housing of each motor. The fhp motors can have any combination of output speeds and torque. A complete assembly of 4 motors costs about $16 in production quantities.

Molon Motor and Coil Corp., Rolling Meadows, Ill.

Circle **218** on Reader Service Card

Auxiliary transmission

Four speed Model 7041 has a Spicer top-mount power take-off for winches pumps and other vehicle mounted devices. For use with standard four or five speed trans-



missions in the 400-600 ft. lb range, Model 7041 has good ratio splits in the top three gears. The shift is made at the same rpm in these splitter positions giving max. engine hp during shifts. Helical gears. Weighs 340 lb for an overall length of 25 3/16 in.

Dana Corp., Toledo, Ohio.

Circle **219** on Reader Service Card

Torque arm reducer

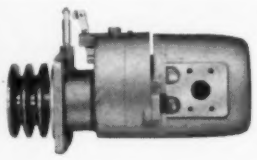
Smallest in the Torque-Arm line, the TD025 reducer had a gear ratio of 25:1, and will transmit up to .95 hp at maximum recommended output speed of 85 rpm. A predetermined combination of reducer and V-belt drive can provide any speed ratio up to 175:1. As a shaft-mounted reducer, it comes with a torque arm for simple adjustment of V-belt drive center distance. Overload release is optional. As a flange mounted reducer, it can be bolted directly to the driven machine or supporting structure. Standard TD025's are bored for mounting on 1¼ in. shafts. Bushings adapt for smaller shafts. A special TD025 for 3/16 in. shafts is also available. Bearings used are Timken tapered roller types. Helical gears and pinions, semi-steel housings.

Dodge Mfg. Corp., Mishawaka, Ind.

Circle **220** on Reader Service Card

Hydraulic pump clutch

The Touch-O-Matic is a remote-controlled clutch and hydraulic pump which eliminates the power take-off. It combines a clutch mech-



anism with a Berry-Douty hydraulic gear pump. For belt, gear or direct drive, the clutch provides engagement speeds (no load) from idle to 2,200 rpm; hp output from ½ to 30 hp and flow rate from 1/7 to 26 gpm. Two series—the C-100 has 4 models, weighs 9 lb; and the C-200 has 3 models, weighs 19 lb. Clockwise or counter-clockwise rotation for both series.

Berry Hydraulics Div., Oliver Tyrone Corp., Corinth, Miss.

Circle **221** on Reader Service Card

Grease in syringes

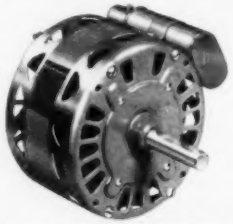
Ball and roller bearing grease, filtered to 10 or 45 microns, is supplied in ½ oz needle syringes. Intended mainly for greasing permanently sealed bearings, it's suitable for most miniature and precision bearings.

Bearing Inspection, Inc., Huntington Park, Calif.

Circle **222** on Reader Service Card

Split capacitor motor

Type CR fractional hp permanent split capacitor motor combines high starting with increased efficiency over earlier models. Avail-



able in both 4- and 6-pole design from 1/20 through 1/4 hp.

Redmond Co., Inc., Owosso, Mich.

Circle **223** on Reader Service Card

Miniature sprag-type clutches

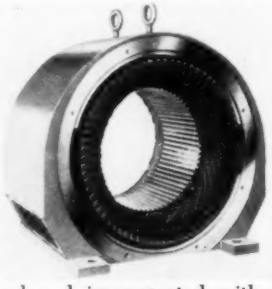
The improved FS-02 and FS-04 replace the earlier models. Model FS-02 provides 4.5 ft lb torque, with a .250 in. bore. The FS-04 has 17 ft lb torque capacity with bore sizes of .375 and .500 in. Both models are for continuous overrunning speeds up to 3450 rpm on model FS-02 and 2400 on the FS-04. Both will index at rates up to 5000 cycles per minute. Feature of the improved design is the use of separately contoured, individual leaf springs to load the sprags. Sprockets, pulleys etc. can now be mounted on the outside diameter of the clutch. Roll pin mounting holes are provided for fastening the inner race to its shaft. Alternatively, the inner or outer race can be press fitted to the shaft. New models are 15% more efficient than earlier ones.

Formsprag Co., Warren, Mich.

Circle **224** on Reader Service Card

Motor insulation

Capsulex Insulation System uses rectangular copper conductors covered with a basic insulation of fused Dacron and fibers which are



formed and impregnated with insulating varnish. The formed coils are encapsulated with silicone elastometer and armored with a

polyester web tape. The coils are then vulcanized to form a sealed protective sheathe.

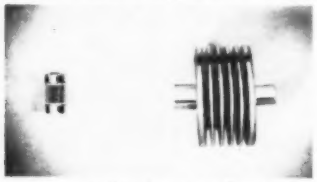
Available in open, drip-proof, splash-proof and weather protected motors.

The Louis Allis Co., Milwaukee, Wis.

Circle **225** on Reader Service Card

Bellows couplings

Sub-miniature to medium size Hi-Flex couplings are suitable for highly sensitive applications, such



as servomechanisms and computers. High degree of flexibility can be used to stretch or compress, to drive a screw while rotating. Negligible side thrust on bearings.

Sterling Precision Corp., Port Washington, N. Y.

Circle **226** on Reader Service Card

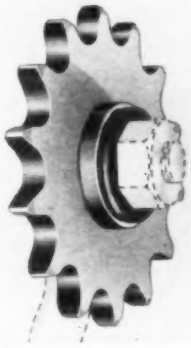
Retaining ring pliers

Heat treated steel pliers available in two models—Nos. 5R and 6R. The 5R compress internal type rings for assembly or disassembly in a bore or housing. The No. 6R pliers are for expanding external type rings, to remove or install over a shaft. A double ratchet holds the handles and stops the ring from springing loose. Standard finish is black oxide.

Waldes Kohinoor, Inc., Long Island City, N. Y.

Circle **227** on Reader Service Card

Idler sprockets



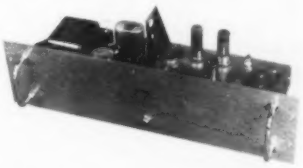
The Uni-Mount is a fully assembled, bearing equipped idler sprocket of case hardened steel. The oil impregnated bearing press-fits in the sprocket bore and slip-fits over the steel journal. The journal itself is case hardened with press-fit steel washers.

Diamond Chain Co., Inc., Indianapolis, Ind.

Circle **228** on Reader Service Card

Servo amplifier

The Model EAPS-A-10 amplifier for use in company "building block" servo systems. Power re-



quirement is 115 volts ac at 1 amp. Controls include: balance, gain, dither and equalizer. Plug-in connections, standard mounting racks. Impedance matched, built-in regulated power supply.

Vickers, Inc., Detroit, Mich.

Circle **229** on Reader Service Card

Insulated thermostat

Model DR-SS is rated 1.5 amp 115 volt ac or 3 amp 28 volt dc

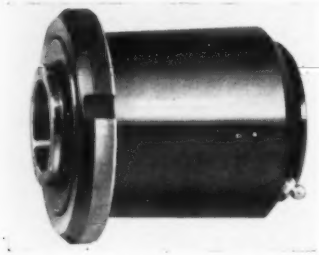
PRODUCT NEWS

(non-inductive). The case is insulated by 2 glass seal solder terminals. Normal standard differential is 1 C max., with an optional max. differential of up to 4 C. Can be calibrated and hermetically sealed at the factory or by the buyer.

Chatam Controls Corp., Chatam, N. J.

Circle **230** on Reader Service Card

Arbor support bearing



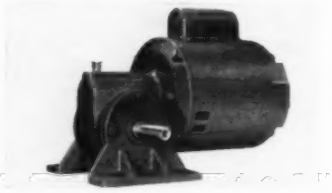
This new design of anti-friction arbor support bearing comes in standard sizes to fit a machine's support housing without re-boring. Simply installed—fits in place and holds with a lock-nut. The ball bearing seats within the support housing so there's no work or fixture interference. Bushings available. Prices reduced 25-30% on previous models.

Briney Mfg. Co., Pontiac, Mich.

Circle **231** on Reader Service Card

Right angle gearmotors

Unusual feature of this ⅛-thru-½ hp line is the reversible output shaft. User can transfer the shaft



to the right or left side of the gear unit on the job. Interchangeable, easily-removed bearing housing plates, so shaft and reduction gear can be taken out and installed on the opposite side. Duty Master ac motor, cast iron gear case with integrally-cast end shield. Thirteen reduction ratios, identical dimensions for all units.

Reliance Electric and Engineering Co., Cleveland, Ohio.

Circle **232** on Reader Service Card

Gear train layout kit

Kit makes gear train layout easier, without re-drawing or using paper cutouts. The layout drawing can be dispensed with in most cases by transfering the gear location dimension from the precision grid board directly to an assembly drawing. Kits contain 8 x 10 in. layout board with 1/10 in. sq. grids, 10 color coded center pins and 100 transparent gear discs. Available in 48, 64, and 96 diametral pitch at $6.50 each.

Advanced Designs, Inc., Vienna, Va.

Circle **233** on Reader Service Card

Shaft adapters

Stock adapters convert tapered or odd dimensioned motor shafts to the use of ¼ in standard-bore gears or couplings. Machined from #303 stainless, with clear passivate finish, the two-piece adapters provide a .2497 (+.000/−.002) standard shaft for synchros, resolvers etc., as well as motors.

PIC Design Corp., East Rockaway, N. Y.

Circle **234** on Reader Service Card

LITERATURE

on drives and components

To get free copies of the following literature, use the Reader Service Cards bound into this issue.

Magnetic disc brakes

Bulletin 605 gives information on a complete line of magnetic disc brakes. This includes the H-40 series with torque ranges of 1 and 3 ft lb; the HTC-50 series from 1½ to 15 ft lb; the HT-70 series from 10 to 105 ft lb; and the new 42000 series from 125 ft lb to 575 ft lb. Gives frame sizes for the various series and complete dimensional data. *Stearns Electric Corp., Milwaukee, Wis.*

Circle **300** on Reader-Service Card

Side bar chains

Offset side bar chains have a tendency to free themselves of dirt and debris and are resistant to fatigue failure. Prices and dimensions in Bulletin No. 8 on the four most widely used sizes—1¼, 1½, 1¾ and 2 in. pitch size in single, double triple and quadruple widths. *Acme Chain Corp., Holyoke, Mass.*

Circle **301** on Reader-Service Card

Timing belt catalog

Catalog features a series of charts which give graphical solutions in place of selection arithmetic. One chart is for selecting pitch from factors of design hp and the largest rpm pulley. Full-page drive-width selection charts and 27 pages of drive tables to find driven pulley and belt pitch length. Catalog 19103, 80-pages. *T. B. Wood's Sons Co., Chambersburg, Pa.*

Circle **302** on Reader-Service Card

Electric motors

Catalog No. 6300 includes squirrel cage ac, wound rotor, special purpose types and dc motors, covering a 1 to 300 hp range. Tabulated basic dimensions, modifications and mounting assembly symbols. Also lists sales offices and services available. *Imperial Electric Co., Akron, Ohio.*

Circle **303** on Reader-Service Card

Electronic adjustable speed drives

Bulletin SL-251-161, 8 pages, deals with the series 25, size 1, speed drives which use standard (½ hp max) dc motors in which the power to the motor is controlled by two thyratron tubes. These in turn are controlled by a magnetic amplifier. Electrical and motor information, construction details and suggested system variations. *Cleveland Machine Controls, Inc., Cleveland, Ohio.*

Circle **304** on Reader-Service Card

Clutches, transmissions

Booklet MM 17 contains bulletins and instruction sheets covering a line of engine accessories—clutches, brakes and transmissions. Features centrifugal clutches, internal expanding brakes and a reversible packaged transmission for 1½ to 5 hp gas engines. Prices, exploded views and dimensioned drawings. *Fairbanks, Morse & Co., Beloit, Wis.*

Circle **305** on Reader-Service Card

Horizontal/vertical drives

These drives are assembled from standard components—a motor, combination pulleys and a horizontal or vertical counter shaft. Right or left hand assembly. Control by dial-set potentiometer or pneumatic regulator. Catalog 70. *Lewellen Mfg. Co., Columbus, Ohio.*

Circle **306** on Reader-Service Card

Industrial load control

Bulletin GET-2916B, revised, 4-pages describes load control systems for industrial plants which generate their own electricity. Systems described include tie-line and frequency control, reactive power control and power limiting control. Schematics and specifications of systems equipment included. *General Electric Co., Schenectady, N. Y.*

Circle **307** on Reader-Service Card

Variable speed belts

Section C to Catalog 61 features a change-over guide for all sizes of belt, listing the manufacturer of the device using it; and a second change-over guide by belt manufacturer. Tabulates standard belt sizes. Includes some details of Adjusta-Link variable speed belting for V-to-V drives. *Lovejoy Flexible Coupling Co., Chicago, Ill.*

Circle **308** on Reader-Service Card

Electronic components

New handbook to assist in selection and application of electromagnetic clutches/brakes—mechanical clutches—torque indicators—torque standards and multi-speed transmissions. Torque conversion chart included. Specifications, dimensional data, schematics. Performance-curve method of operation. Also ordering code on 354 standard clutch/brake units. *Autotronics Inc., Florissant, Mo.*

Circle **309** on Reader-Service Card

Stainless ball bearings

Four-page bulletin includes the MRC line of stainless steel ball bearings available in the single row, deep groove radial type used for most applications requiring this type of steel. Complete dimensional details and load rating data. Typical applications listed. *Marlin-Rockwell Corp., Jamestown, N. Y.*

Circle **310** on Reader-Service Card

Bearing screw

Uses a helical screw and mating nut assembly. The nut consists of anti-friction bearing, spaced by a cage, with an annular groove which serve as the outer race. Sections cover a planetary and positive drive assembly; typical ap-

LITERATURE

plications; price list and dimensioned drawings. *Roton Products Div., The Anderson Co., Gary, Ind.*

Circle **311** on Reader-Service Card

Limit switch

This new limit switch senses within 1/32 in. without contact, has only one moving part and is sealed against dust, oil mist and moisture. It operates at 60 cycles per minute and needs no auxiliary circuits. Fold-out flyer has all the details. *Tann Controls Co., Tann Corp., Detroit, Mich.*

Circle **312** on Reader-Service Card

Electric motor controls

Catalog 5900 has 74 pages on most types of electric motor control. Prices and data on drum, foot, float, pressure, tap and limit switches; magnetic contactors and starters, manual starters, push buttons, relays, thermal relays; and a general section on accessories and applications. *Furnas Electric Co., Batavia, Ill.*

Circle **313** on Reader-Service Card

Involute checker

Technical Data Sheet #1124 describes the Sine-Line Model 1124 Involute Checker, which includes optical setting of the sine bar so accuracy of the instrument is independent of operator "feel". Angles can be set within 0.001 in. without the use of gage blocks. Data sheet shows how the checker works and how it rapidly checks the consistency of form of successive teeth. *Michigan Tool Co., Detroit, Mich.*

Circle **314** on Reader-Service Card

Flat belting

Brochure details construction and advantages of bonded leather and polymer belts. Tabulated hp ratings and belt types, sections on selection, tensioning and maintenance. Application examples and graphs. *Extremultus, Inc., Englewood, N.J.*

Circle **315** on Reader-Service Card

Industrial felt

Catalog features a ready reference index which lists hundreds of applications of industrial felts with the proper type to use. Uses include ball bearing retaining washers, seals, grease retainers, vibration isolators, etc. *Continental Felt Co. New York, N. Y.*

Circle **316** on Reader-Service Card

Flat top roller chain

Bulletin No. 9 describes a new flat-top conveyor roller chain. The top plates are made of Delrin which is resistant to foods and detergents as well as industrial materials such as oils and greases. Bulletin includes sizes and prices. *Acme Chain Corp., Holyoke, Mass.*

Circle **317** on Reader-Service Card

Leather packings

Illustrated brochure and price list describes leather packings for hydraulic and pneumatic applications. Complete instructions for ordering V and U packings, cups, flanges, discs and washers. *Auburn Mfg. Co., Middletown, Conn.*

Circle **318** on Reader-Service Card

AC motor bulletin

Bulletin B-2515 describes the complete line of Duty Master ac

motors from 1 to 2000 hp. Points out product features of each motor and explains selection system. *Reliance Electric and Engineering Co., Cleveland, Ohio.*

Circle **319** on Reader-Service Card

Electro-mechanical parts

This 552-page catalog (#65), reportedly the most inclusive in the field, is divided into 67 product categories, including speed reducers, magnetic clutches and brakes, differentials, electronic hardware, teflon terminals and limit stops. Within each category it presents part numbers, OEM list prices, specifications, and test reports. *Sterling Instrument Div., Designatronics, Port Washington, N. Y.*

Circle **320** on Reader-Service Card

Recirculating roller bearing

The Recirc-L-Way has a coefficient of friction as low as .00025 under 500 lb load and 0.25 in. per minute linear motion. Data Sheet S-133 gives details on this made-to-order bearing. *Kaydon Engineering Corp., Muskegon, Mich.*

Circle **321** on Reader-Service Card

Over-running clutch, coupling

Bulletin No. 231 details a series over-running clutches over-running couplings and combinations including an fhp clutch/coupling. Cross-sections, tabulated dimensions. Two data pages on standard and flexible over-running couplings. *The Hilliard Corp., Elmira, N. Y.*

Circle **322** on Reader-Service Card

Variable speed belt chart

New wall chart gives measuring, coupling and installation directions for a line of variable speed belting. All directions fully illustrated. Chart is printed on card, measures 11 in. wide by 17 in. deep and is designed for mounting in stockrooms, parts departments, etc. *Manheim Mfg. & Belting Co., Manheim, Pa.*

Circle **323** on Reader-Service Card

Electric brakes, clutches

Engineering Bulletin specifies the series 08 and the series 17 fhp clutch couplings, clutches and brakes. Gives operating instructions, dimensioned cross-sections, minimum torque curves for both series and a price list. *Haydon Div., General Time Corp., Torrington, Conn.*

Circle **324** on Reader-Service Card

Oil level gauges

Type 550 flush mounting oil level gauges give a visual check on oil levels of hydraulic and lubricating oil reservoirs or other liquid level applications. Three standard sizes with 4, 6, and 8 in. long-sight openings. Interchangeable parts for petroleum, fire resistant fluids, etc. Flyer and data sheets give details. *Federal Brass Mfg. Co., Elmira, N. Y.*

Circle **325** on Reader-Service Card

Miniature pressure switches

Four-page pamphlet and order form gives specifications of gage type pressure and low pressure switches in standard aluminum, stainless steel, and explosion proof construction. Simple design with only one moving part. *Pamar Electronics Co., Inc., Cresskill, N. J.*

Circle **326** on Reader-Service Card

MEN

of the power transmission field

Bass elected president at American Pulley

Bass

Walter C. Bass was elected to the position of President of American Pulley Company Division, at a recent meeting of the Board of Directors of Van Norman Industries, Inc. In his new position, he will be entirely responsible for all facets of American Pulley Company's operations.

Bass joined American Pulley in the Spring of 1959 as general sales manager. In early 1960 he was advanced to the position of executive vice president and director of sales. In announcing the appointment, the Board credited Bass with the progress American Pulley has made since it became a Division of Van Norman Industries, Inc.

Before coming to American Pulley, Bass was Sales Manager of Foote Brothers Gear and Machine Corporation. His experience includes mechanical goods sales and engineering—Goodyear Tire and Rubber Co.; staff engineer, Goodyear Aircraft Corporation; and various sales assignments, including Sales Manager for Morse Chain Co.

New president of Imperial Electric

Richard J. Hearty, executive vice-president of The Imperial Electric Company since 1953, now becomes president, succeeding his father, John Hearty who had been president of the Akron company from 1904 until his death recently.

Richard Hearty joined the company in 1941 after his graduation from Georgetown University. Since the war, he has served as plant manager of the company's Middleport, Ohio facilities for three years, and in 1953 was named executive vice-president. He has been active in the affairs of the motor and generator section of the National Electrical Manufacturers Association and is a member of the Electrical Manufacturers Club.

American Sealants names Michigan sales manager

Duane R. Branaka, recently appointed Michigan district sales manager for the American Sealants Co. will coordinate company sales through representatives and distributors. His appointment represents a major expansion of efforts in an important industrial area.

Branaka

Bryan

Lima Electric promotes promotion manager

Darrel Bryan, formerly sales promotion manager for the Lima Electric Motor Co., Inc., has been promoted to general sales manager, according to an announcement by Lima's president, Wayne M. Gideon.

In his new position, Bryan directs all sales activity for Lima's line of integral horsepower motors, generators and drives. He will also continue as sales manager.

He attended Ball State College in Muncie, Indiana, and had been with the Condec Company for three-and-a-half years.

Appointed Detroit manager for Hewitt-Robins

R. S. Schuba has been appointed Detroit district manager for Hewitt-Robins Incorporated, with responsibility for the marketing of conveyor machinery, power transmission equipment and industrial rubber products in Detroit, Lansing, Flint, Saginaw, Grand Rapids, Kalamazoo, South Bend and surrounding areas.

Schuba was formerly in charge of sales in Louisville, Ky. He was educated at the University of Richmond and Illinois Institute of Technology.

Schuba

Kent

Kent to direct industrial relations at Foote Bros.

Edward C. Kent is the new director of industrial relations for Foote Bros Gear & Machine Corp., and its subsidiary, the Whitney Chain Co.

For the past 12 years, Kent has been industrial relations director for Chicago's Acme Steel Co.

Chief engineer for Warner Electric

Edwin J. Newberg has been named chief industrial engineer for Warner Electric Brake & Clutch Company. Paul Whaley, works manager, who announced the appointment, said Newberg will be responsible for time study, processing, and method engineering groups at Warner Electric's two plants.

Newberg attended Marquette University and was graduated from the University of Wisconsin in 1947 with a Bachelor of Science degree in mechanical engineering.

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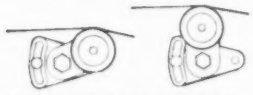
Controlled tensioning eliminates shock loading through excessive chain vibration, and horsepower loss through belt slippage.



- **ROTATING ARM ACTION FOR GREATER ADJUSTMENT**
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A low cost tensioner for single and multiple width drives that is more adaptable to machine frames. *See your Power Transmission Distributor* or write . . .

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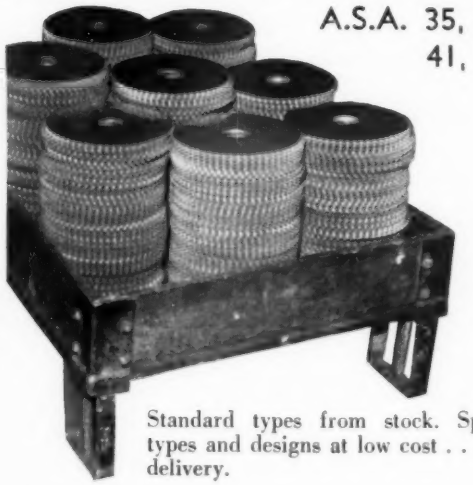

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New **LIMA GREEN SEAL DRIPPROOF MOTORS**

. . . are unconditionally warranted, if properly sized on application, and will be replaced FREE OF CHARGE if you experience any trouble.

- Special insulating materials assure longer motor life.
- Special dynamic balancing of rotor.
- Final protective coating of GREEN SEAL epoxy varnish.
- Special bearing lubricant.
- Slinger on motor shaft.
- Gasketed connection box.
- Corrosion resistant hardware.
- Corrosion resistant epoxy coating on rotor.

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Darrel Bryan
general sales manager

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If you are designing a new machine or redesigning one for better performance, your local Gates Field Engineer will be glad to help you. He can show you how to take full advantage of the many opportunities offered by Gates Super HC High Capacity Drives.

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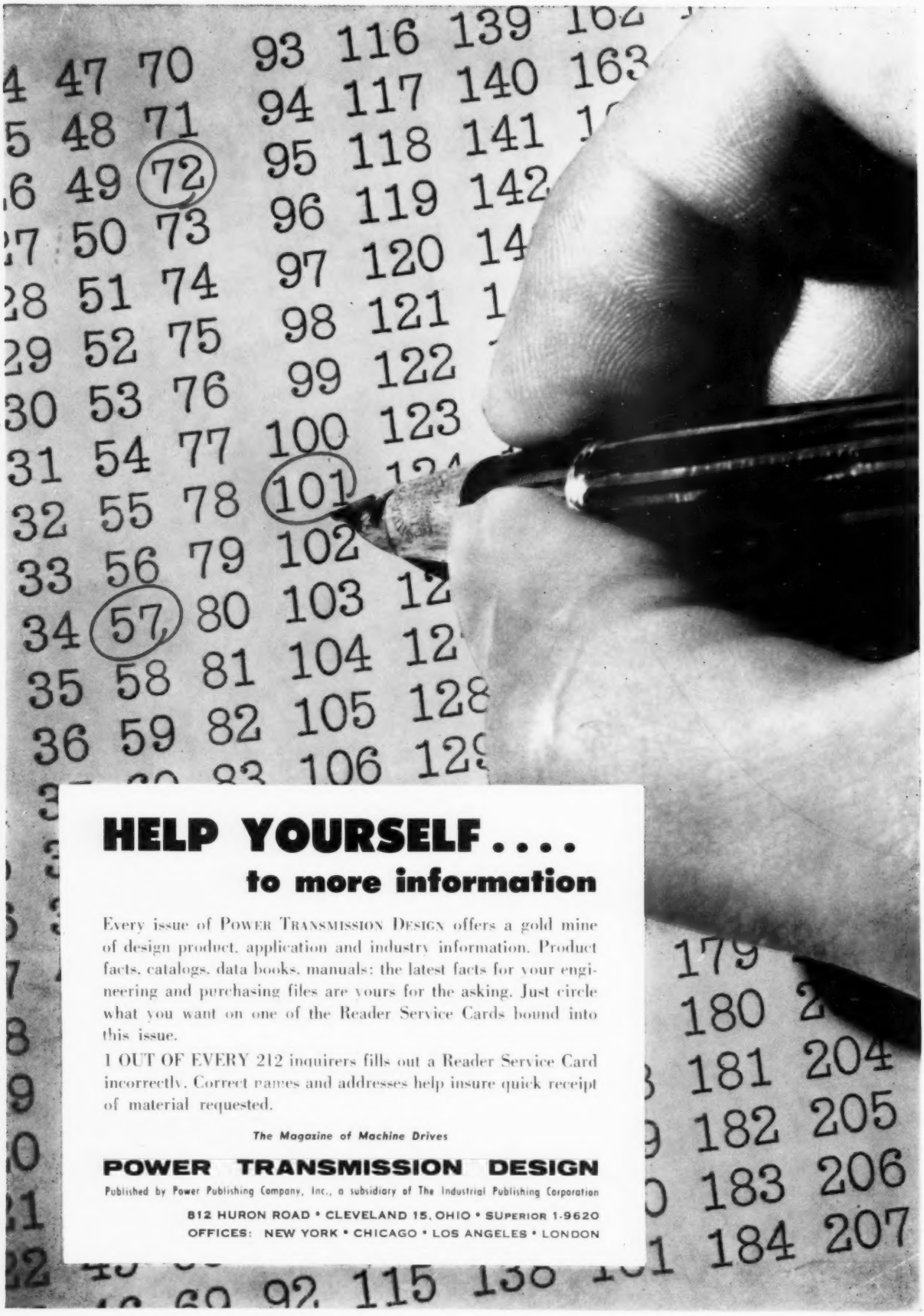

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The Magazine of Machine Drives

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